PHILISHAVE

NUDOS

Service
Service
Service

Domestic Appliances and Personal Care

Service Manual

This booklet is for determining and for ordering of service parts.
The service manual of below mentioned typenumbers will follow in due course.

HQ 2405/A	**HQ 2425/A**				
HQ 2610/A					
HQ 2830/A					
HQ 3405/A	**HQ 3425/A**	**HQ 3445/A**			
HQ 3605/A	**HQ 3610/A**				
HQ 3805/B	**HQ 3810/B**	**HQ 3825/B**	**HQ 3830/B**	**HQ 3845/B**	**HQ 3850/B**
HQ 3865/B	**HQ 3870/B**				
HQ 4405/A	**HQ 4425/A**	**HQ 4445/A**			
HQ 4625/A	**HQ 4630/A**				
HQ 4805/B	**HQ 4810/B**	**HQ 4825/B**	**HQ 4830/B**	**HQ 4845/B**	**HQ 4850/B**
HQ 4865/B	**HQ 4870/B**	**HQ 4885/B**	**HQ 4890/B**		

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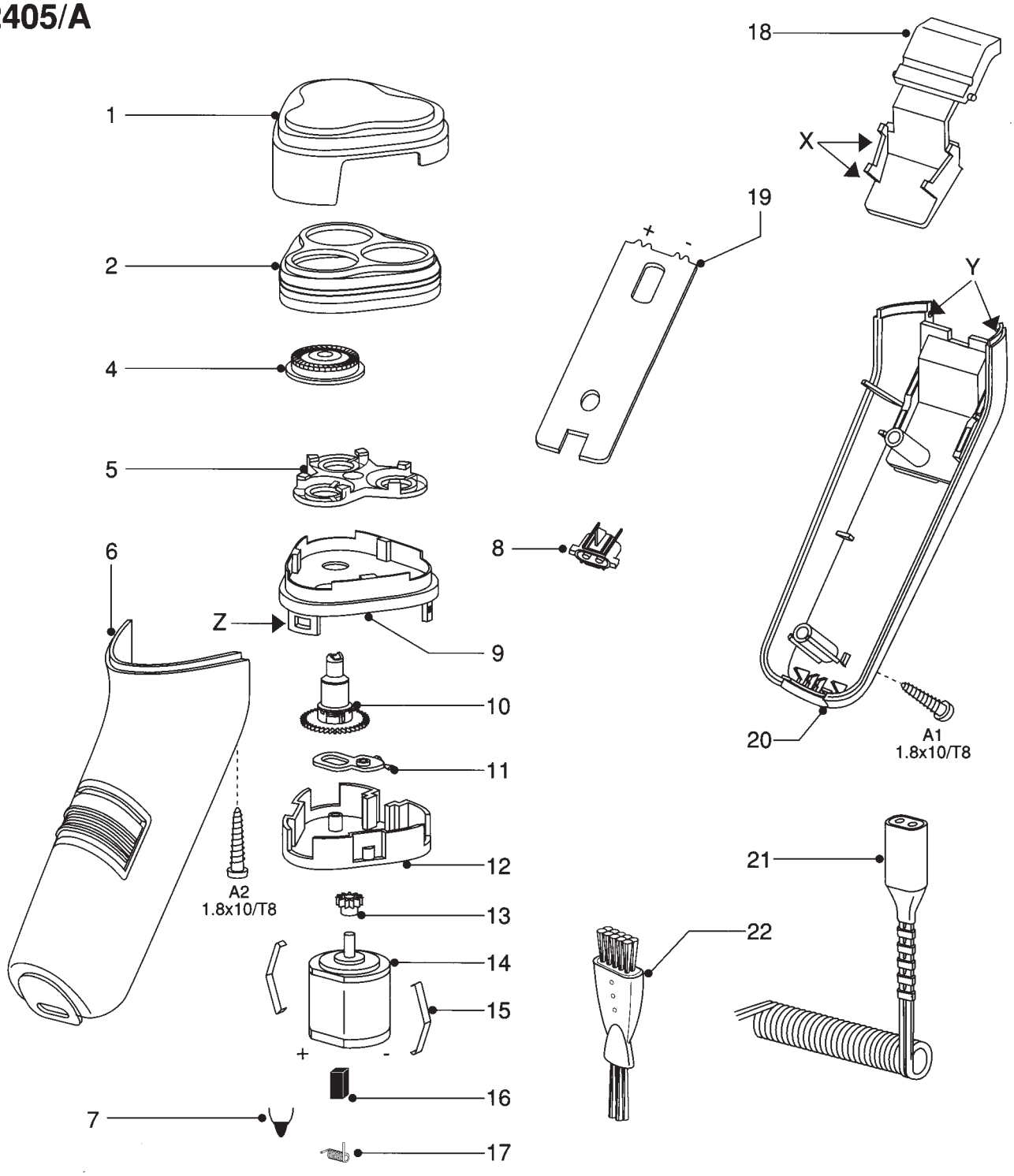
4822 729 21785
97/04

PCS 88 395

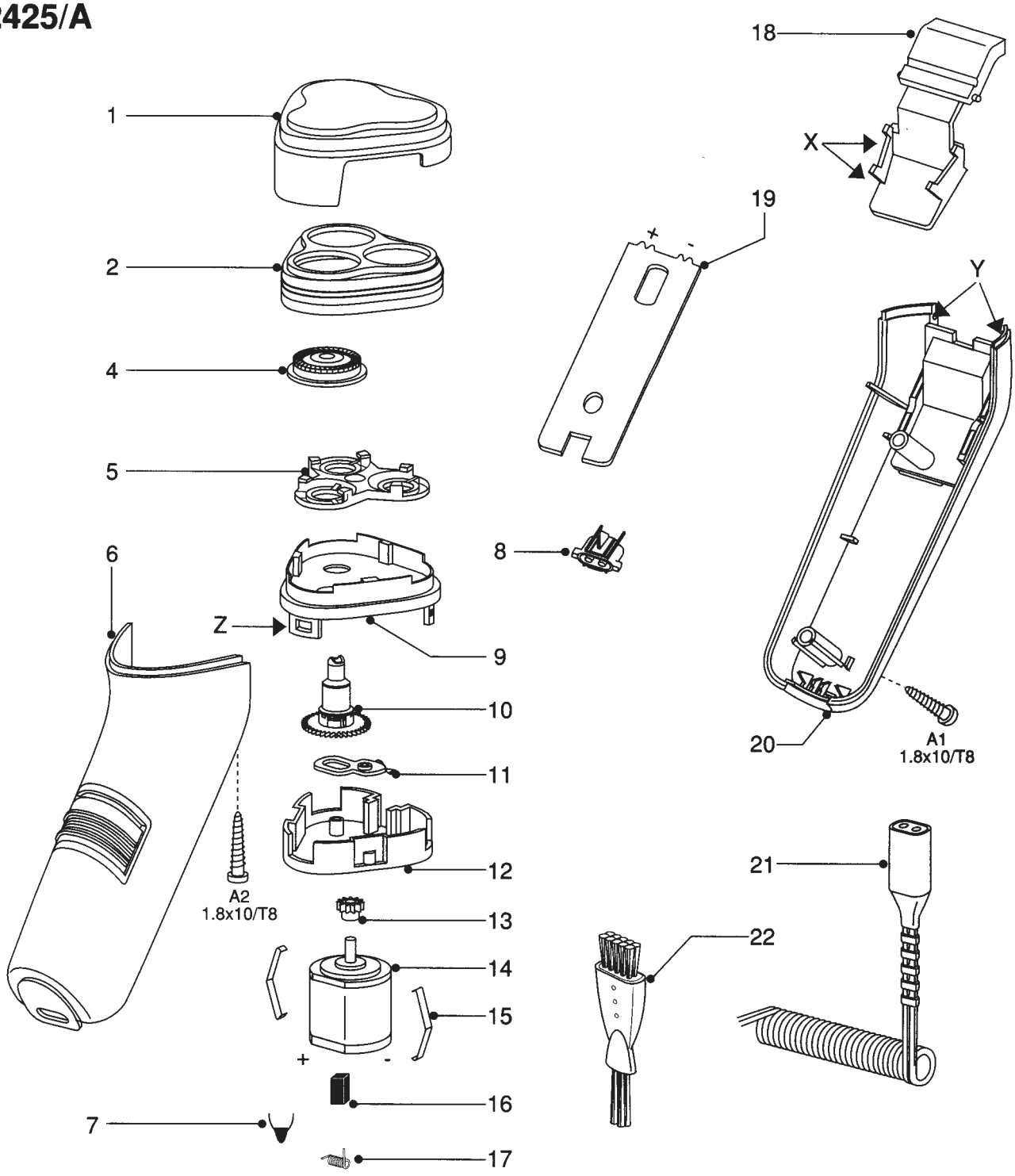
PHILIPS

HQ 2405/A



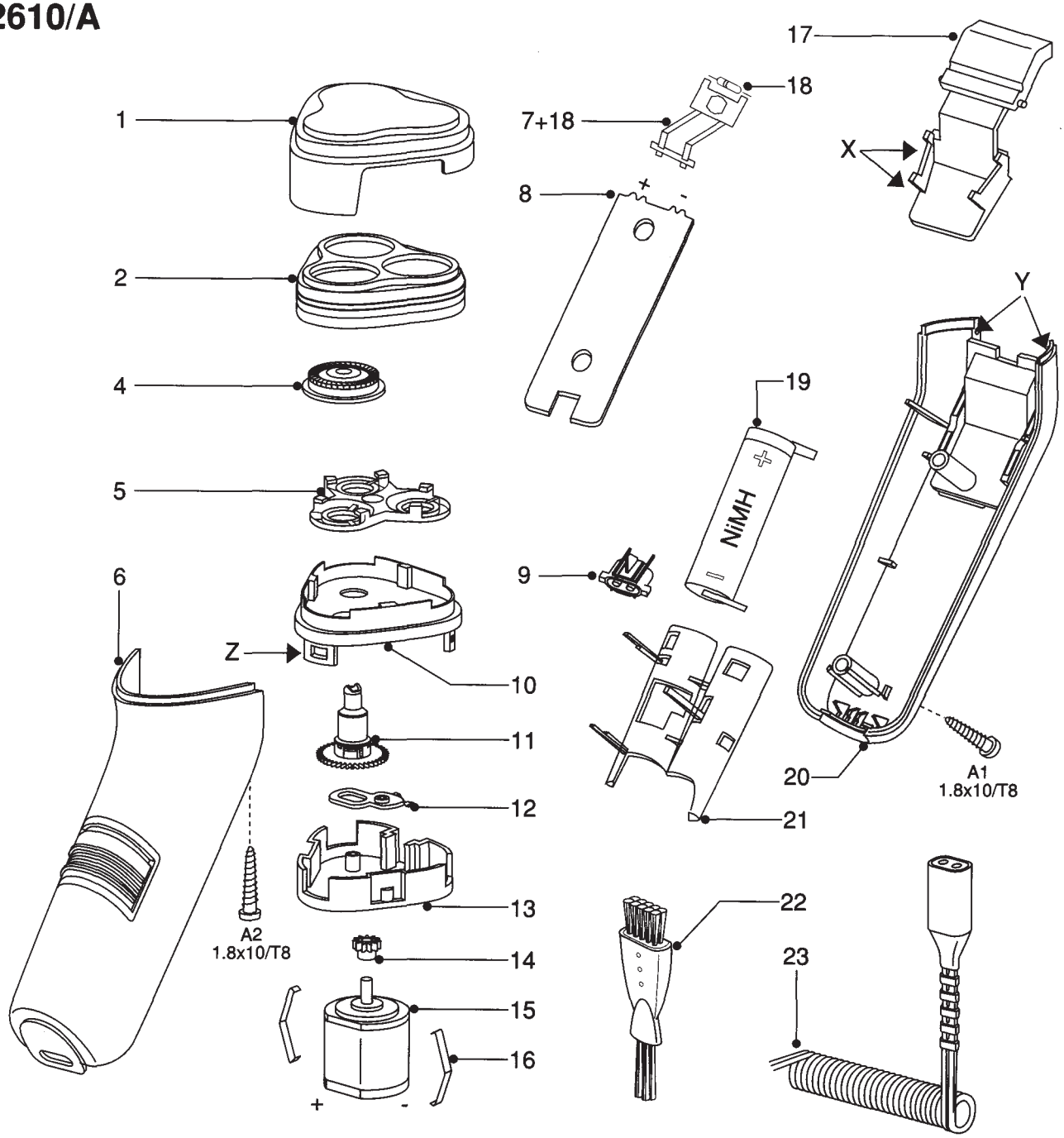
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
4	4822 690 30469	HQ2 shaving head
5	4822 404 40657	head holder
6	4822 441 11918	housing PH
7	4822 122 31177	cap. 470 pF
8	4822 267 31458	inlet
9	4822 442 00808	hairchamber PH
10	4822 522 33194	gearwheel
11	4822 404 40656	lever
12	4822 441 11275	frame
13	4822 522 33039	pinion
14	4822 361 30455	motor
15	4822 492 63165	motor clamp
16	4822 362 40181	carbon brush
17	4822 492 62703	contact spring
18	4822 690 30384	trimmer
19	4822 214 70599	power module
20	4822 442 00809	cover
21	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
22	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 2425/A



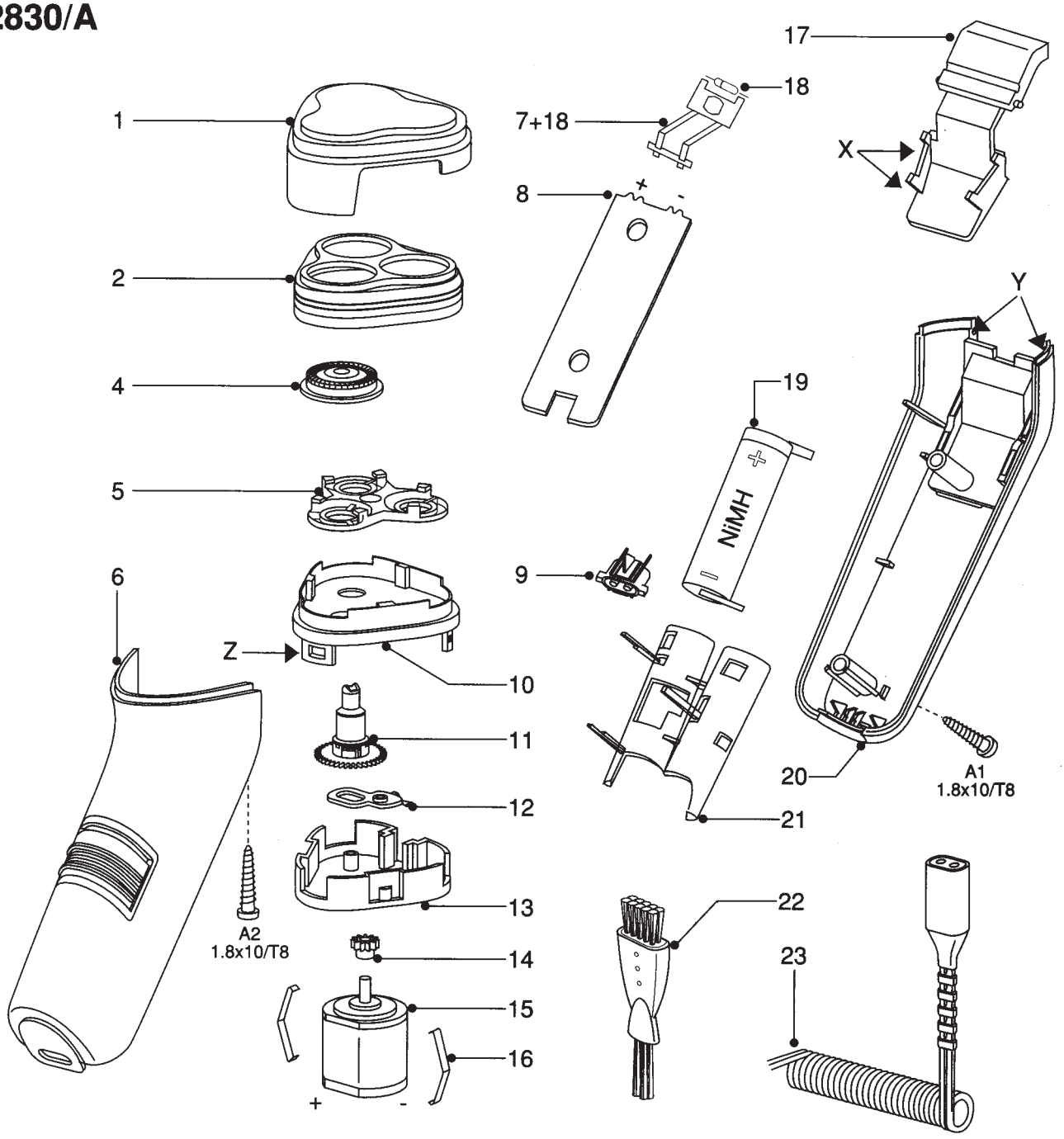
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
4	4822 690 30469	HQ2 shaving head
5	4822 404 40657	head holder
6	4822 441 11917	housing PH
7	4822 122 31177	cap. 470 pF
8	4822 267 31458	inlet
9	4822 442 00808	hairchamber PH
10	4822 522 33194	gearwheel
11	4822 404 40656	lever
12	4822 441 11275	frame
13	4822 522 33039	pinion
14	4822 361 30455	motor
15	4822 492 63165	motor clamp
16	4822 362 40181	carbon brush
17	4822 492 62703	contact spring
18	4822 690 30384	trimmer
19	4822 214 70599	power module
20	4822 441 11348	cover
21	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
22	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 2610/A



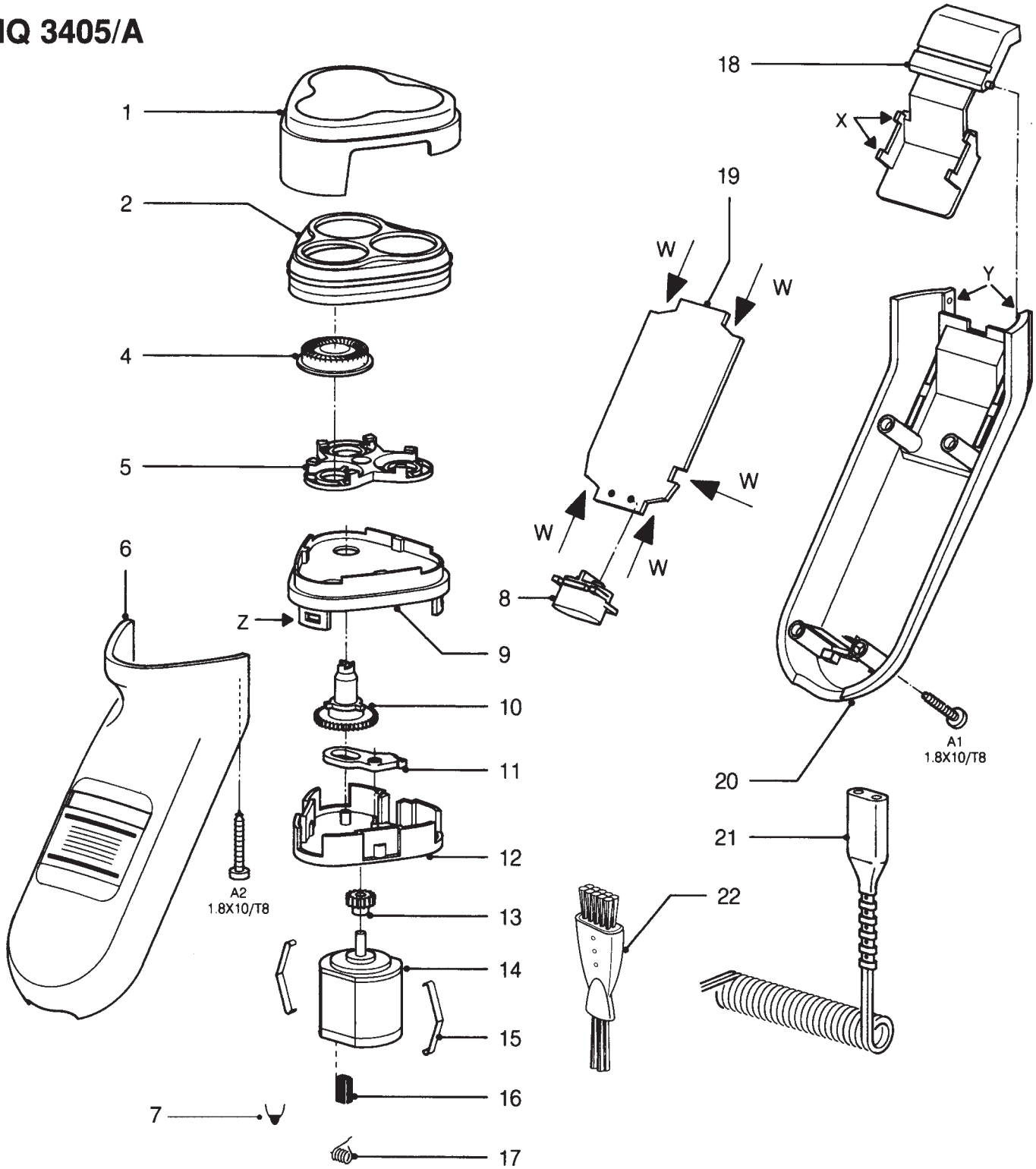
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
4	4822 690 30469	HQ2 shaving head
5	4822 404 40657	head holder
6	4822 441 11921	housing PH
7	4822 265 10924	connector 39mm
8	4822 214 12097	power module
9	4822 267 31458	inlet
10	4822 442 00808	hairchamber PH
11	4822 522 33193	gearwheel
12	4822 404 40656	lever
13	4822 441 11275	frame
14	4822 522 32851	pinion
15	4822 361 21752	motor
16	4822 492 63165	motor clamp
17	4822 690 30384	trimmer
18	4822 130 32173	OF217 diode
19	4822 138 10584	NiMH cell AA
20	4822 442 00809	cover
21	4822 256 91849	holder
22	4822 479 30183	cleaning brush
23	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 2830/A



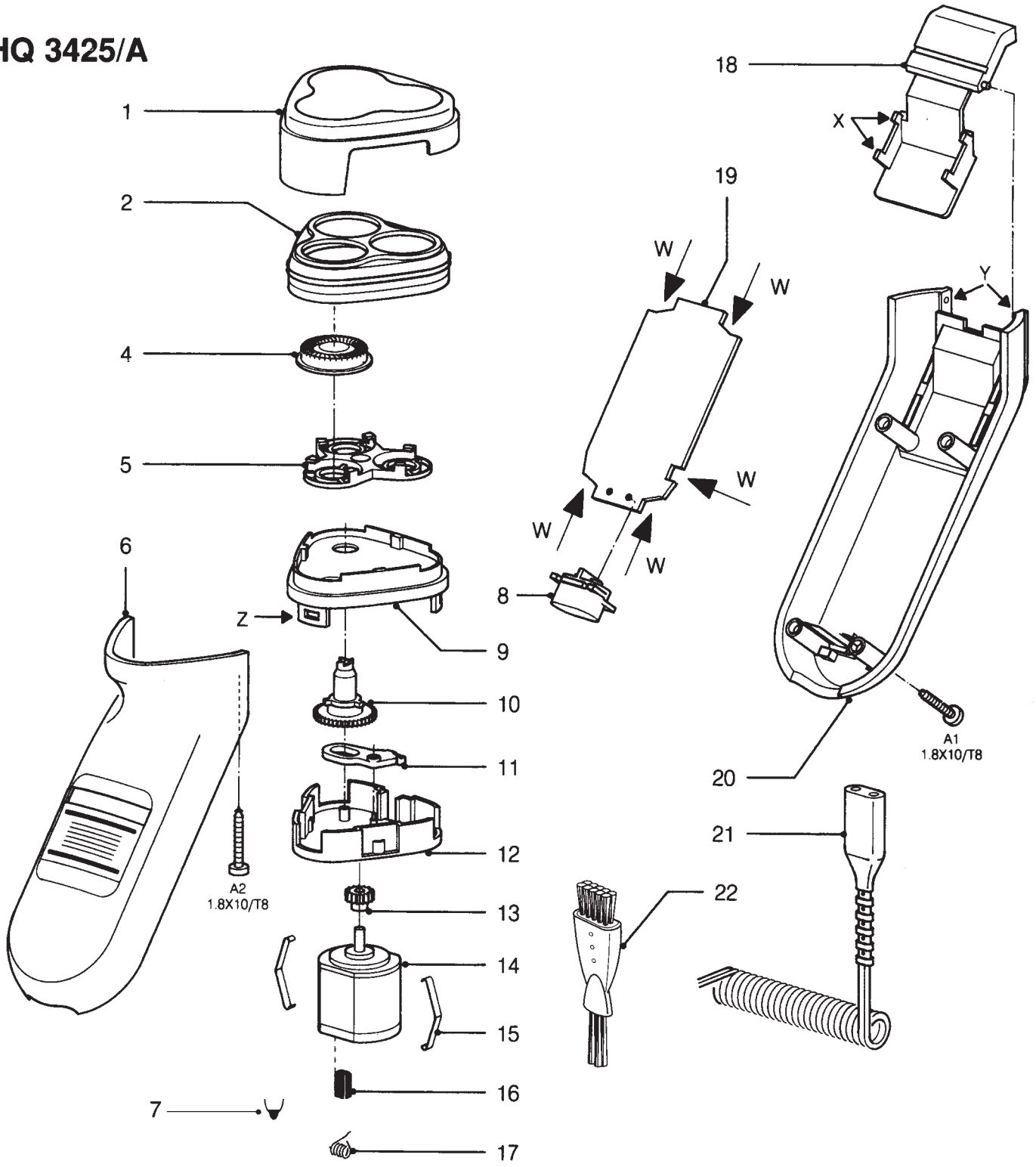
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
4	4822 690 30469	HQ2 shaving head
5	4822 404 40657	head holder
6	4822 441 11922	housing PH
7	4822 265 10924	connector 39mm
8	4822 214 12098	power module
9	4822 267 31458	inlet
10	4822 442 00808	hairchamber PH
11	4822 522 33193	gearwheel
12	4822 404 40656	lever
13	4822 441 11275	frame
14	4822 522 32851	pinion
15	4822 361 21752	motor
16	4822 492 63165	motor clamp
17	4822 690 30384	trimmer
18	4822 130 32173	OF217 diode
19	4822 138 10584	NiMH cell AA
20	4822 441 11348	cover
21	4822 256 91849	holder
22	4822 479 30183	cleaning brush
23	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3405/A



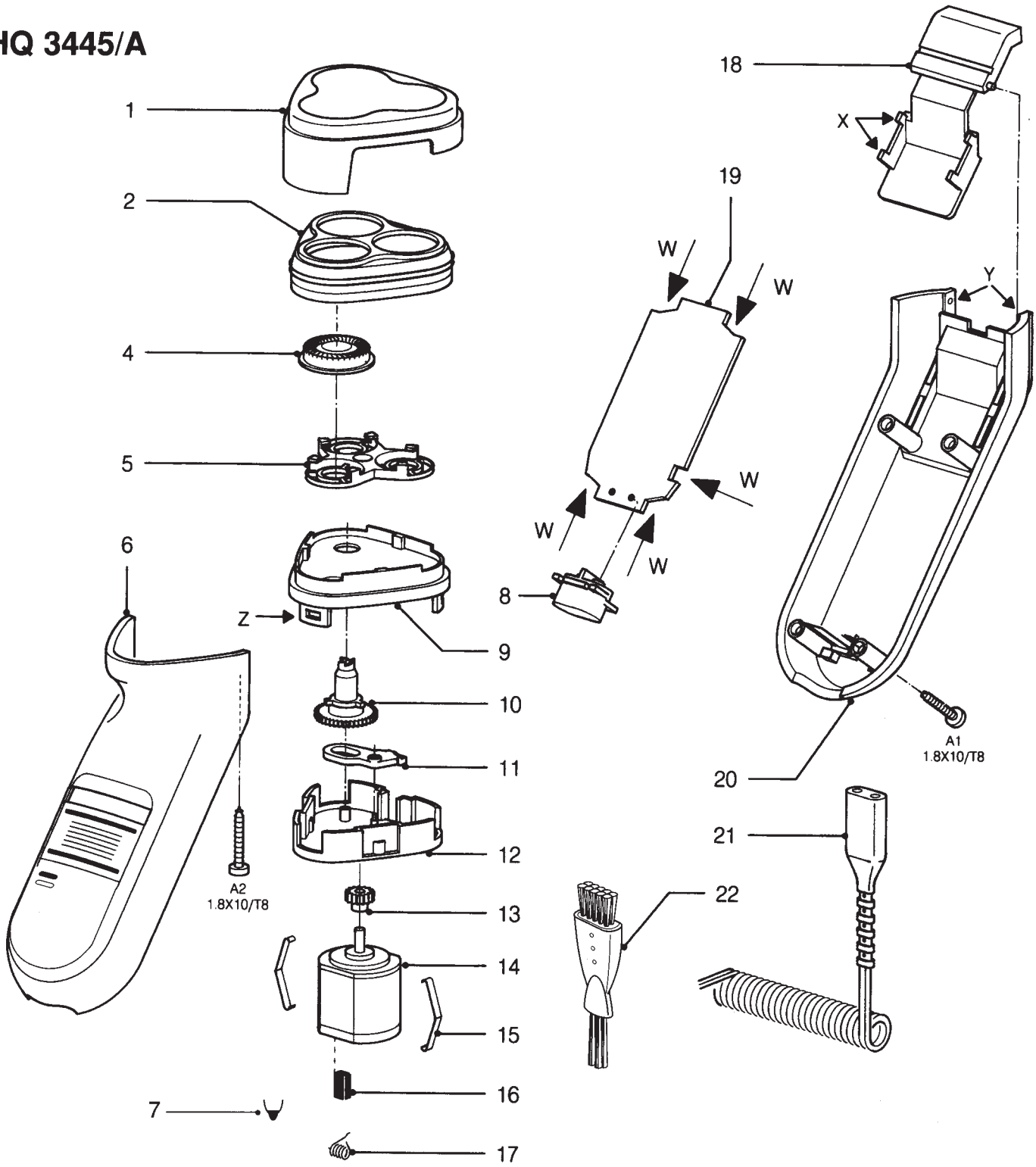
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11886	housing PH
7	4822 122 31177	cap. 470 pF
8	4822 267 31319	inlet
9	4822 442 00743	hairchamber PH
10	4822 522 33041	gearwheel
11	4822 404 40656	lever
12	4822 441 11275	frame
13	4822 522 33039	pinion
14	4822 361 30247	motor
15	4822 492 71735	motor clamp
16	4822 362 40181	carbon brush
17	4822 492 62703	contact spring
18	4822 690 10081	trimmer
19	4822 214 70363	power module
20	4822 441 11316	cover
21	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
22	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3425/A



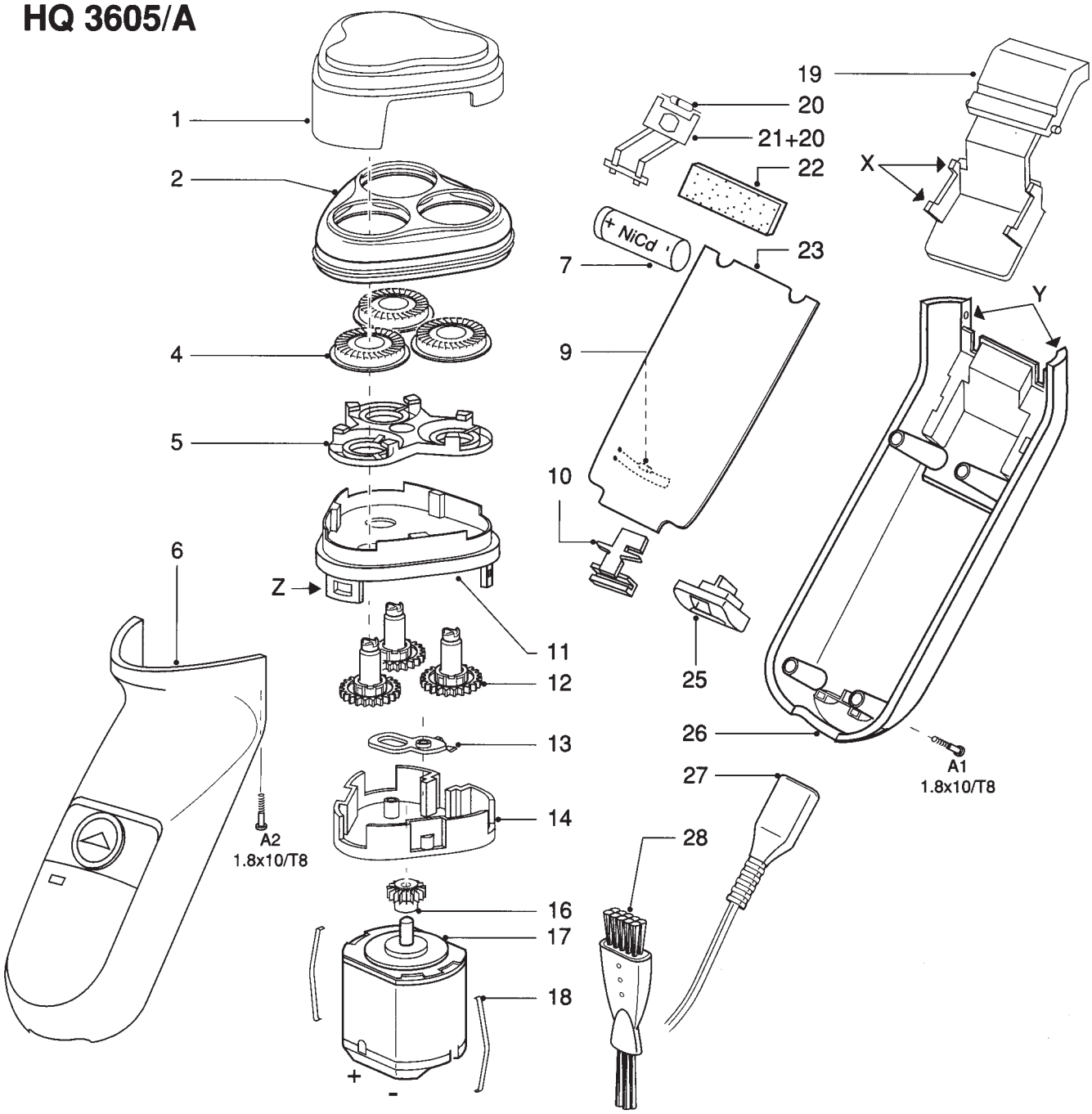
1	4822 441 11276	protecting cap	17	4822 492 62703	contact spring
2	4822 441 11292	head housing	18	4822 690 10081	trimmer
4	4822 690 30471	HQ3 shaving head	19	4822 214 70363	power module
5	4822 404 40657	head holder	20	4822 441 11316	cover
6	4822 441 11892	housing PH	21	4822 321 10095	flex EU
				4822 321 10096	flex GB
7	4822 122 31177	cap. 470 pF		4822 321 10097	flex CDN
8	4822 267 31319	inlet		4822 321 10148	flex AUS/NZ
9	4822 442 00743	hairchamber PH		4822 321 10344	flex USA
10	4822 522 33041	gearwheel	22	4822 479 30183	cleaning brush
11	4822 404 40656	lever			
			A	4822 502 30526	s.t.screw 1.8x10/T8
12	4822 441 11275	frame			
13	4822 522 33039	pinion			
14	4822 361 30247	motor			
15	4822 492 71735	motor clamp			
16	4822 362 40181	carbon brush			

HQ 3445/A



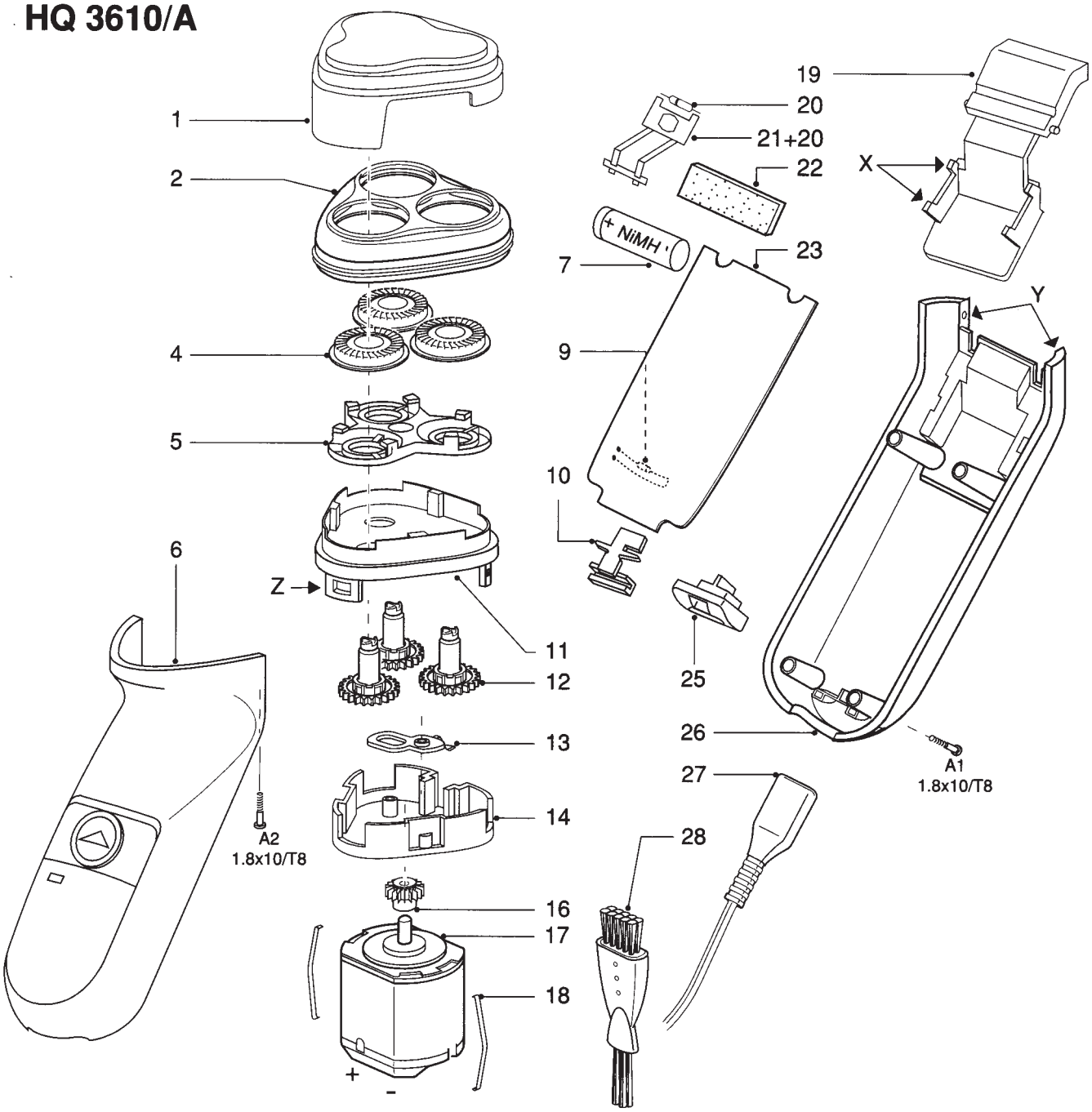
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11893	housing PH
7	4822 122 31177	cap. 470 pF
8	4822 267 31319	inlet
9	4822 442 00743	hairchamber PH
10	4822 522 33041	gearwheel
11	4822 404 40656	lever
12	4822 441 11275	frame
13	4822 522 33039	pinion
14	4822 361 30247	motor
15	4822 492 71735	motor clamp
16	4822 362 40181	carbon brush
17	4822 492 62703	contact spring
18	4822 690 10081	trimmer
19	4822 214 70363	power module
20	4822 442 00751	cover
21	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
22	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3605/A



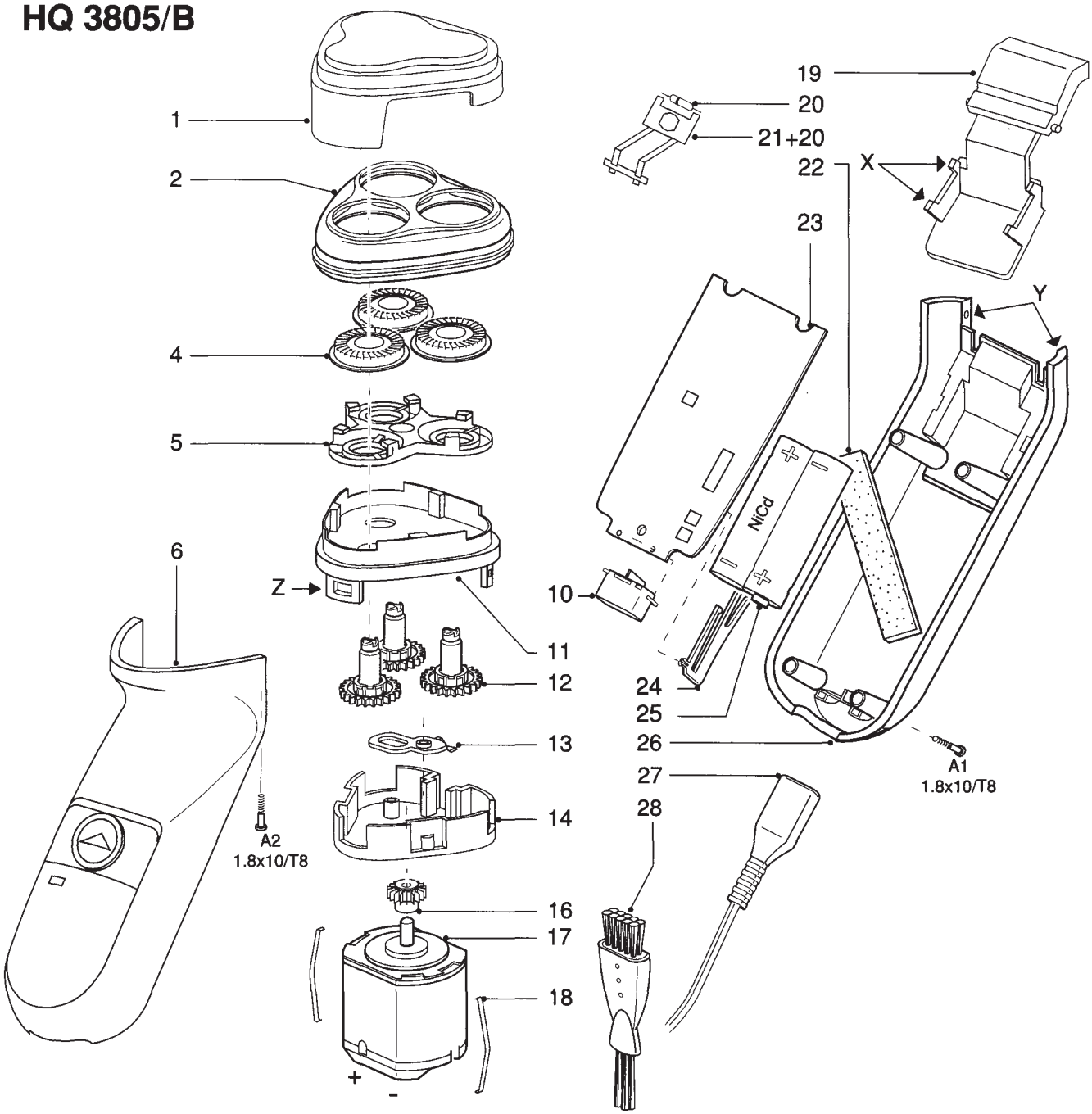
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11937	housing
7	4822 138 10611	NiCd cell 4/5AF
8		
9	4822 252 20287	thermal fuse
10	4822 277 21777	voltage slide
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 21752	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 11519	power module
24		
25	4822 268 10347	inlet
26	4822 442 00381	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3610/A



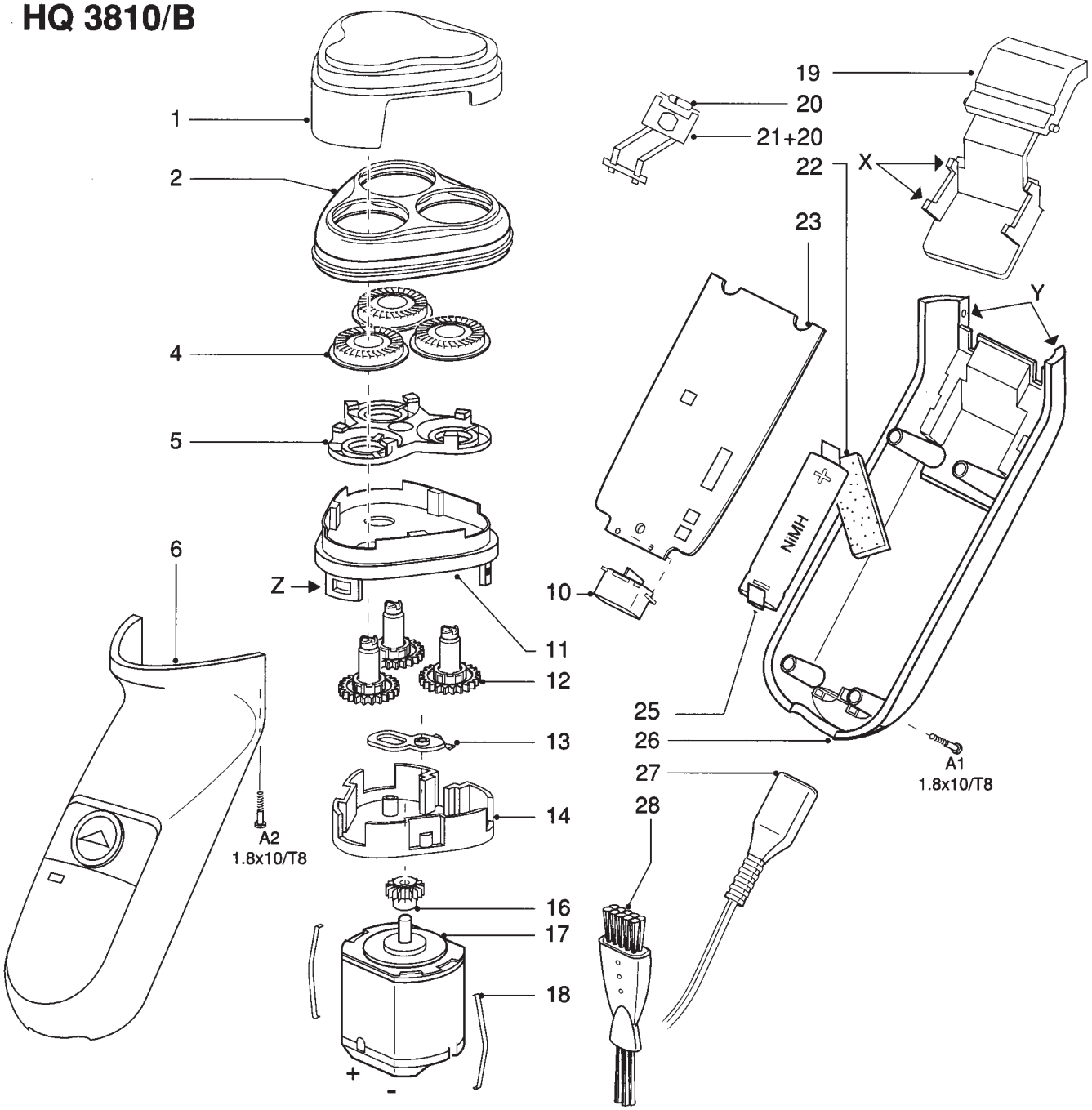
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11942	housing
7	4822 138 10568	NiMH cell 4/5AA
8		
9	4822 252 20287	thermal fuse
10	4822 277 21777	voltage slide
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 21752	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12168	power module
24		
25	4822 268 10347	inlet
26	4822 442 00844	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3805/B



1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11945	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 20936	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12204	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 441 11495	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

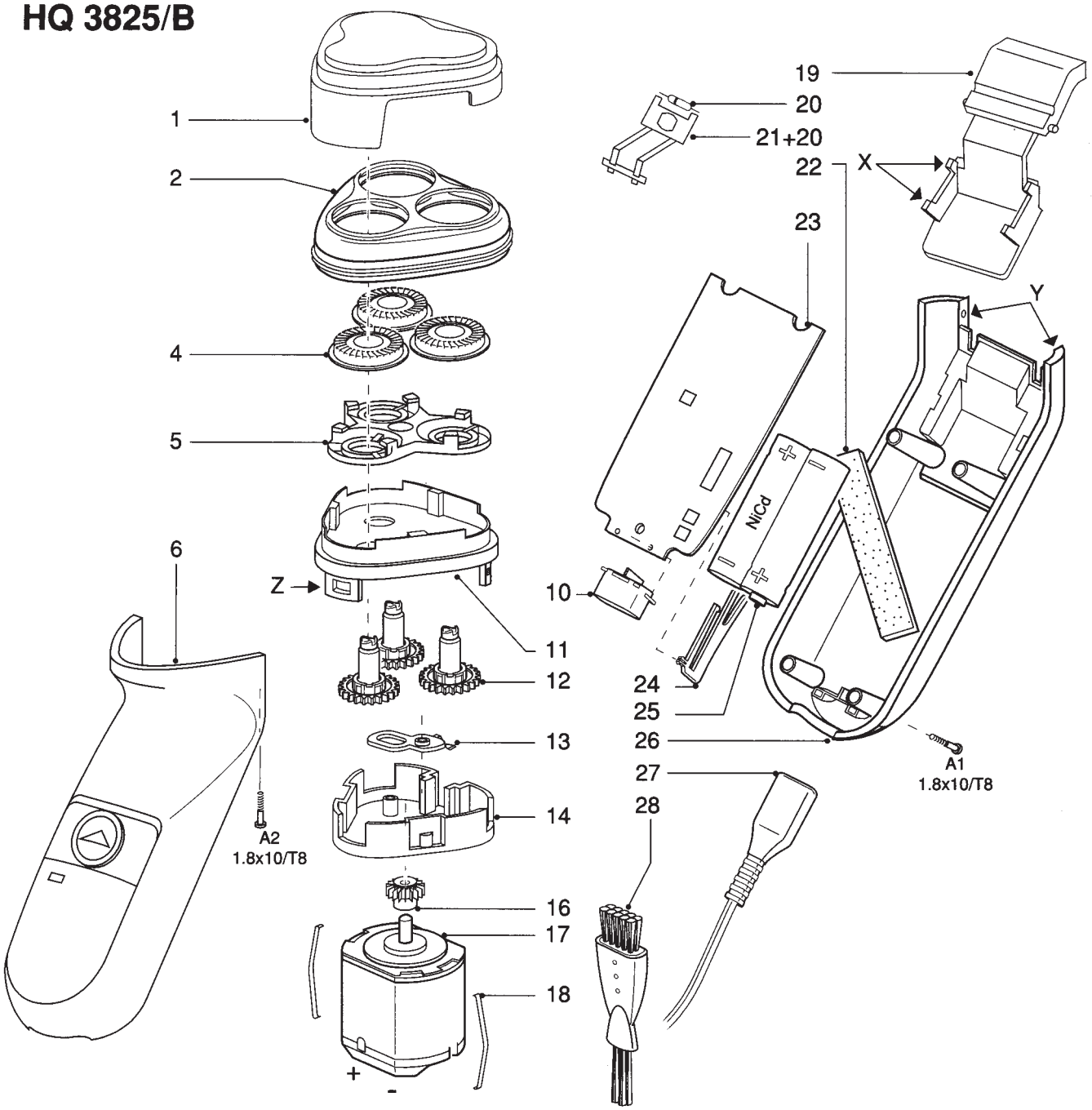
HQ 3810/B



1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11946	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 21752	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12208	power module
24		
25	4822 138 10584	NiMH cell AA
26	4822 441 11495	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

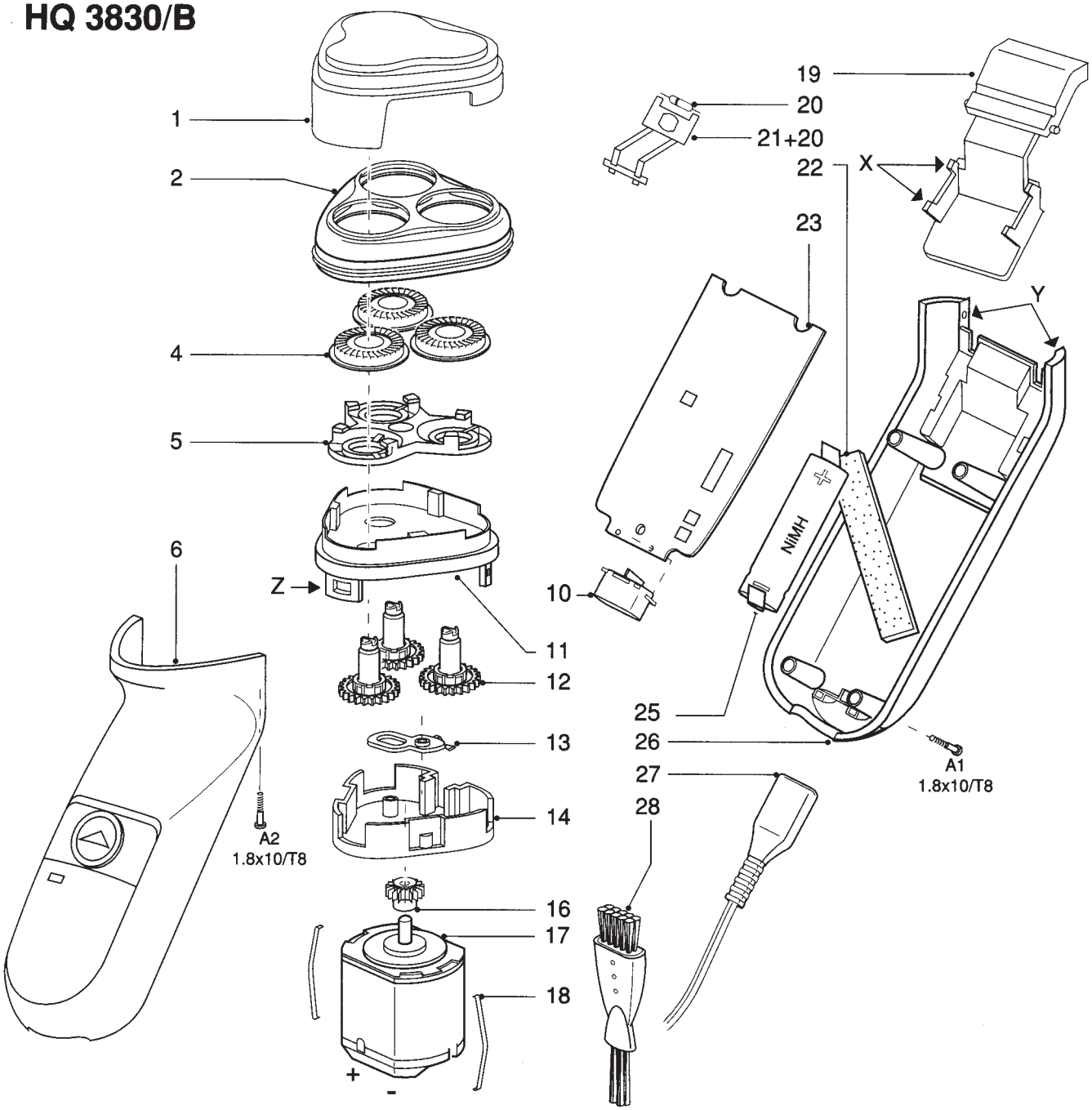
PCS 88 378

HQ 3825/B



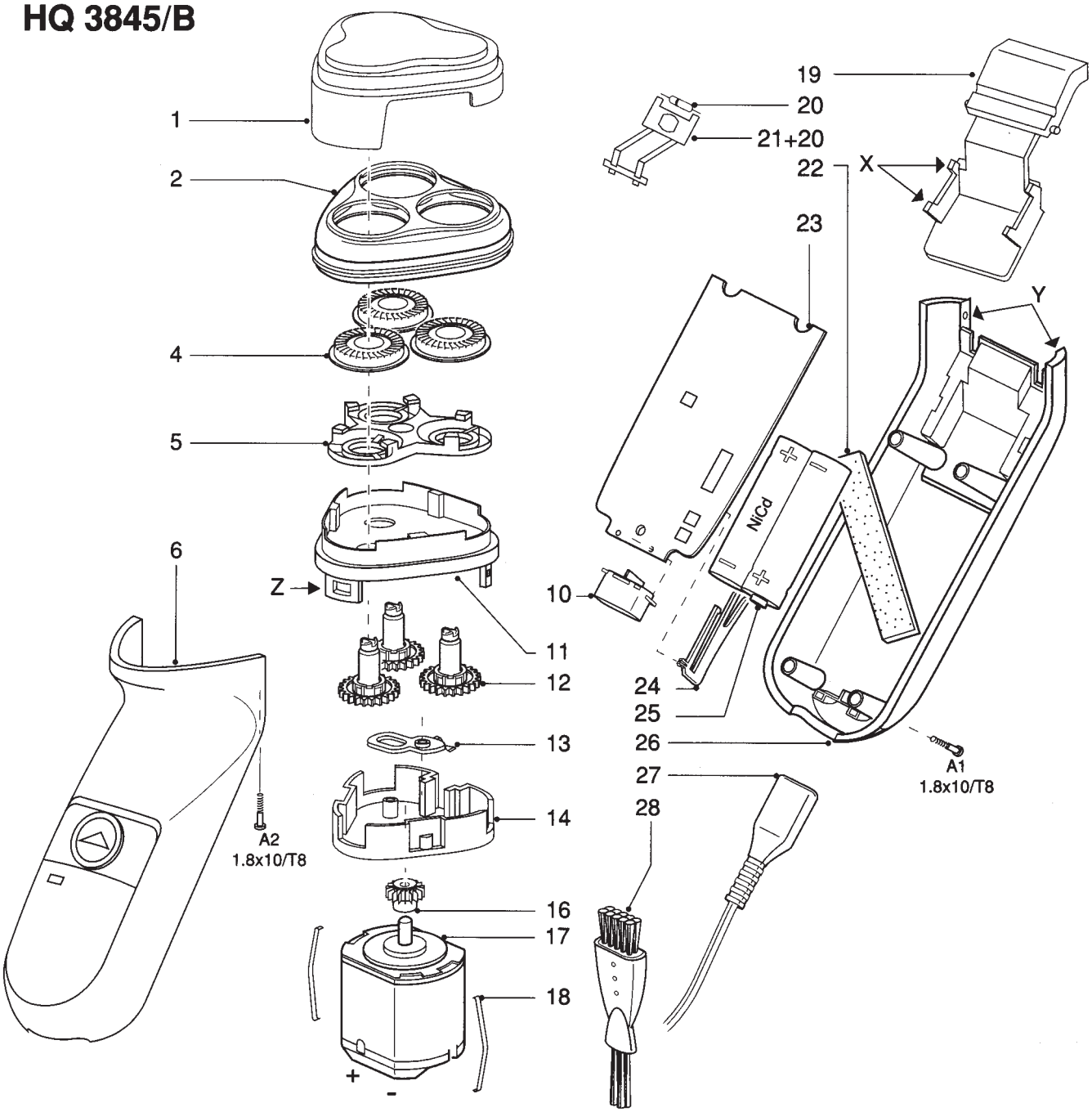
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11947	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 20936	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12204	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 441 11495	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3830/B



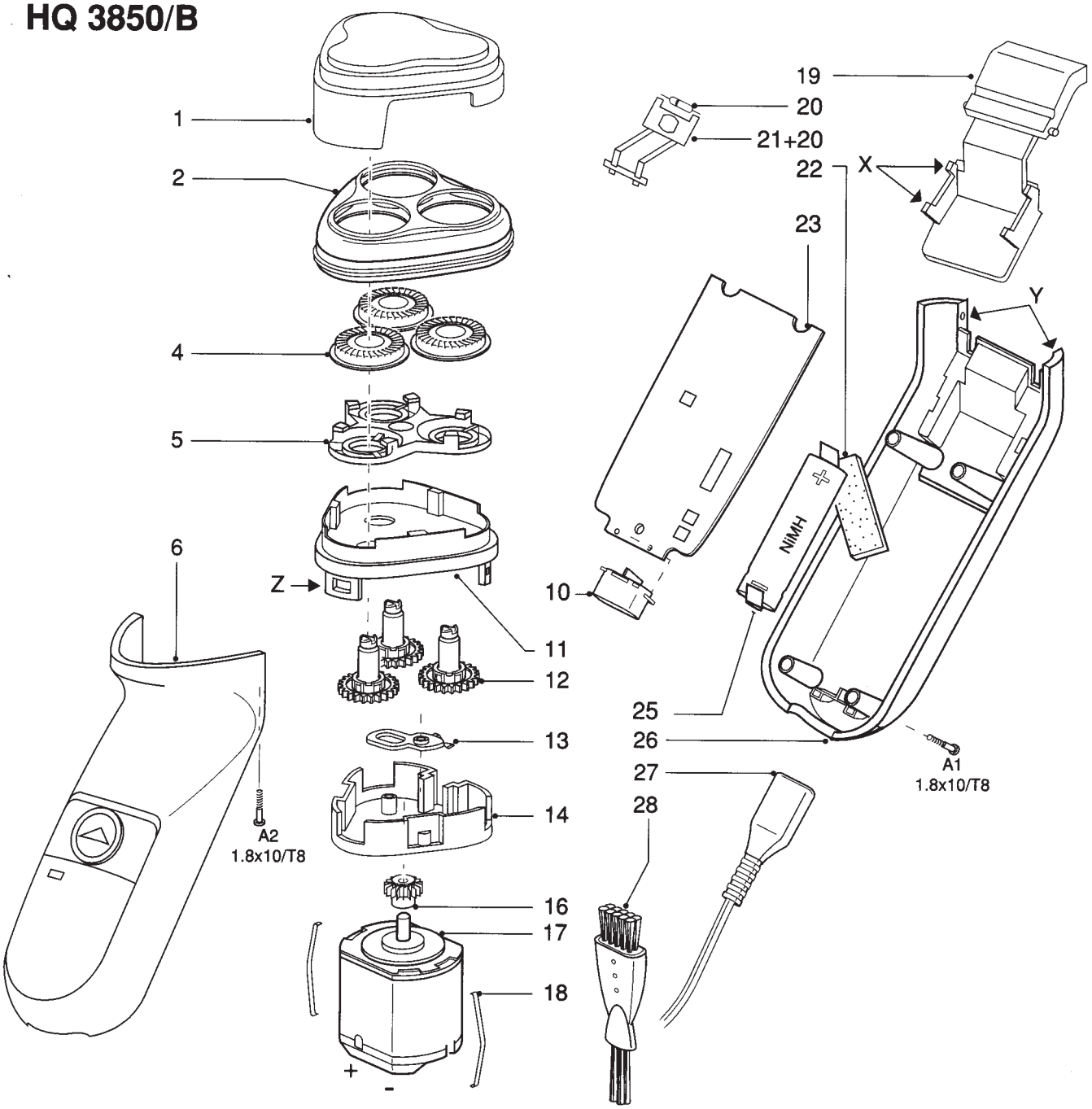
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11948	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 21752	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12088	power module
24		
25	4822 138 10584	NiMH cell AA
26	4822 441 11495	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3845/B



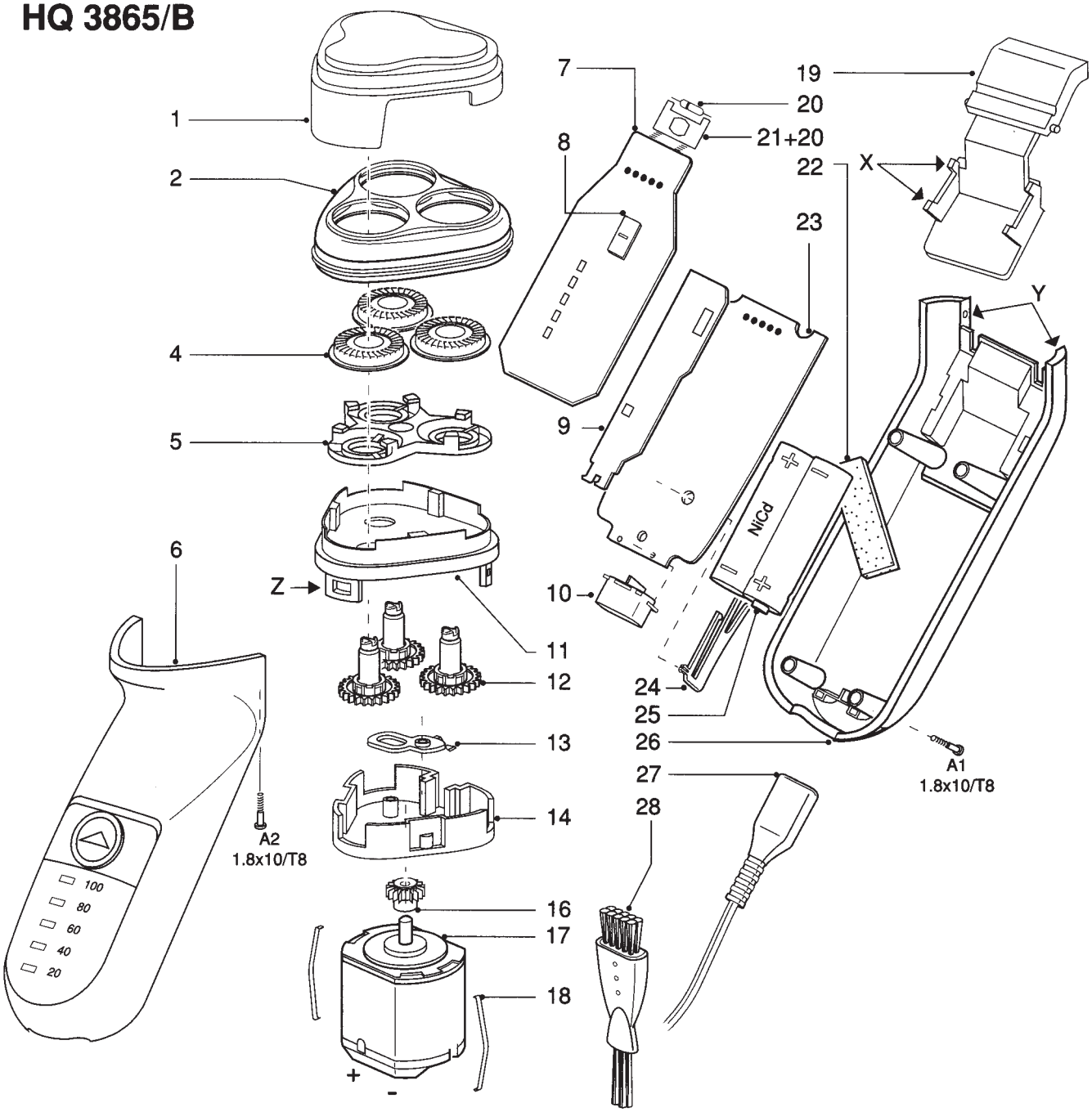
1	4822 441 11276	protecting cap	21	4822 265 10924	connector 39mm
2	4822 441 11292	head housing	22	4822 466 91312	foam plate
3			23	4822 214 12132	power module
4	4822 690 30471	HQ3 shaving head	24	4822 256 92094	holder
5	4822 404 40657	head holder	25	4822 138 10334	NiCd pack AA
6	4822 441 11931	housing	26	4822 442 00828	cover
7			27	4822 321 10095	flex EU
8				4822 321 10096	flex GB
9				4822 321 10097	flex CDN
10	4822 267 31319	inlet		4822 321 10148	flex AUS/NZ
11	4822 442 00743	hairchamber		4822 321 10344	flex USA
12	4822 522 32852	gearwheel	28	4822 479 30183	cleaning brush
13	4822 404 40656	lever	A	4822 502 30526	s.t.screw 1.8x10/T8
14	4822 441 11275	frame			
15					
16	4822 522 32851	pinion			
17	4822 361 20936	motor			
18	4822 492 63165	motor clamp			
19	4822 690 10081	trimmer			
20	4822 130 32173	OF217 diode			

HQ 3850/B



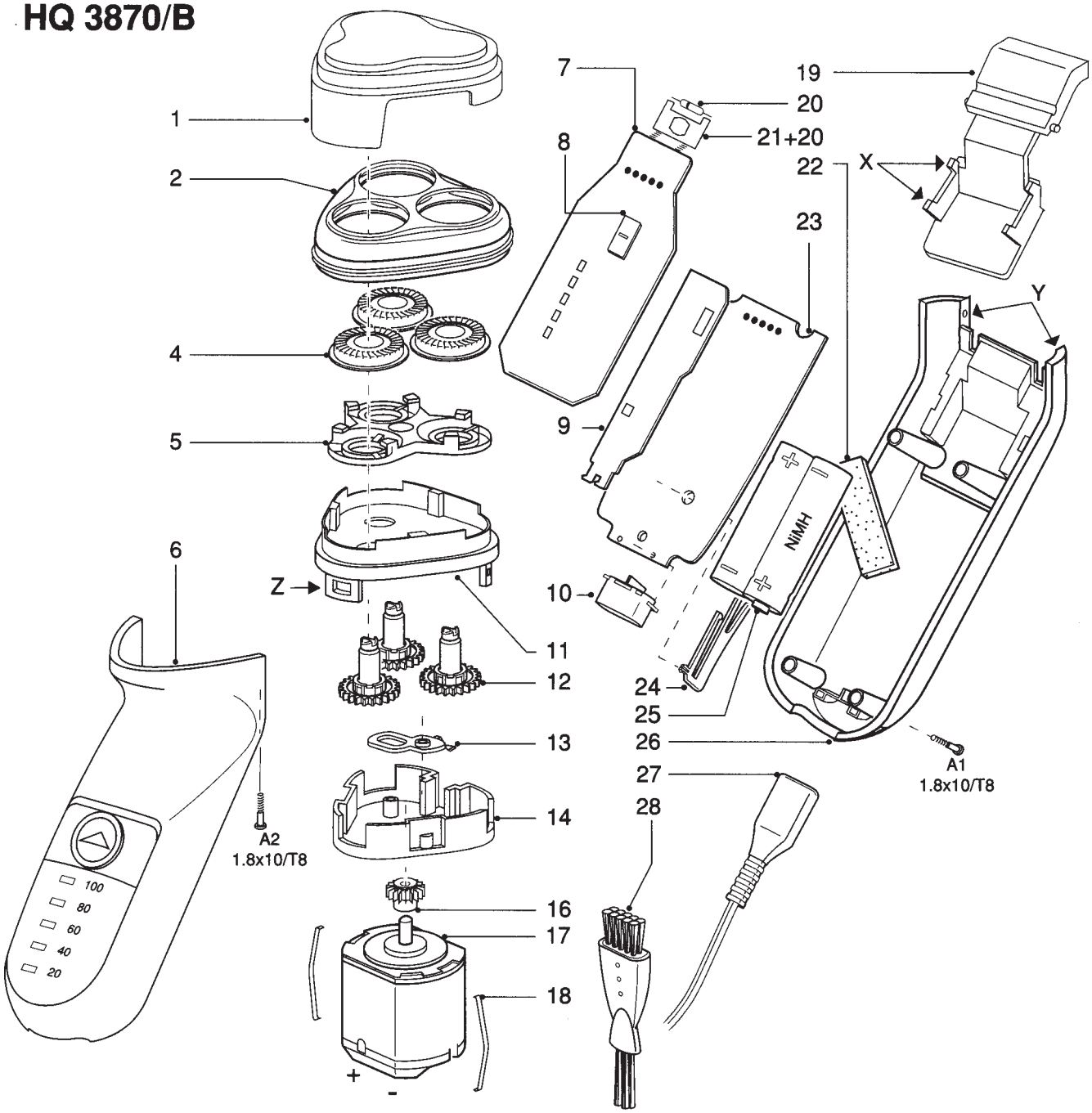
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11929	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 21752	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12088	power module
24		
25	4822 138 10584	NiMH cell AA
26	4822 442 00828	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 3865/B



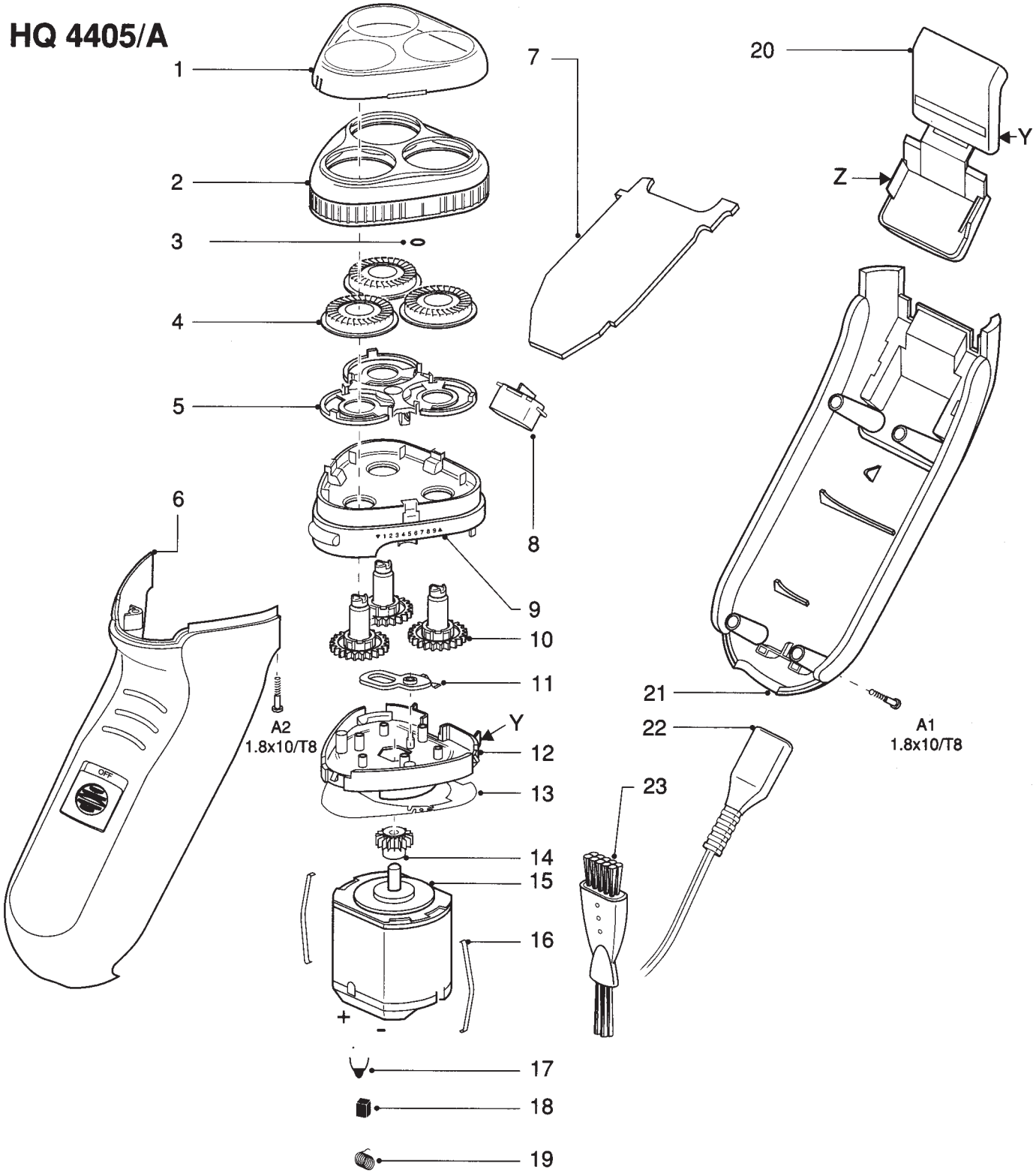
1	4822 441 11276	protecting cap	21	4822 265 10916	connector 21mm
2	4822 441 11292	head housing	22	4822 466 91312	foam plate
3			23	4822 214 12089	power module
4	4822 690 30471	HQ3 shaving head	24	4822 256 92094	holder
5	4822 404 40657	head holder	25	4822 138 10334	NiCd pack AA
6	4822 441 11928	housing	26	4822 442 00827	cover
7	4822 214 12131	control module	27	4822 321 10095	flex EU
8	4822 277 21689	on/off switch		4822 321 10096	flex GB
9	4822 256 10349	holder		4822 321 10097	flex CDN
10	4822 267 31319	inlet		4822 321 10148	flex AUS/NZ
11	4822 442 00743	hairchamber		4822 321 10344	flex USA
12	4822 522 32852	gearwheel	28	4822 479 30183	cleaning brush
13	4822 404 40656	lever	A	4822 502 30526	s.t.screw 1.8x10/T8
14	4822 441 11275	frame			
15					
16	4822 522 32851	pinion			
17	4822 361 20936	motor			
18	4822 492 63165	motor clamp			
19	4822 690 10081	trimmer			
20	4822 130 32173	OF217 diode			

HQ 3870/B



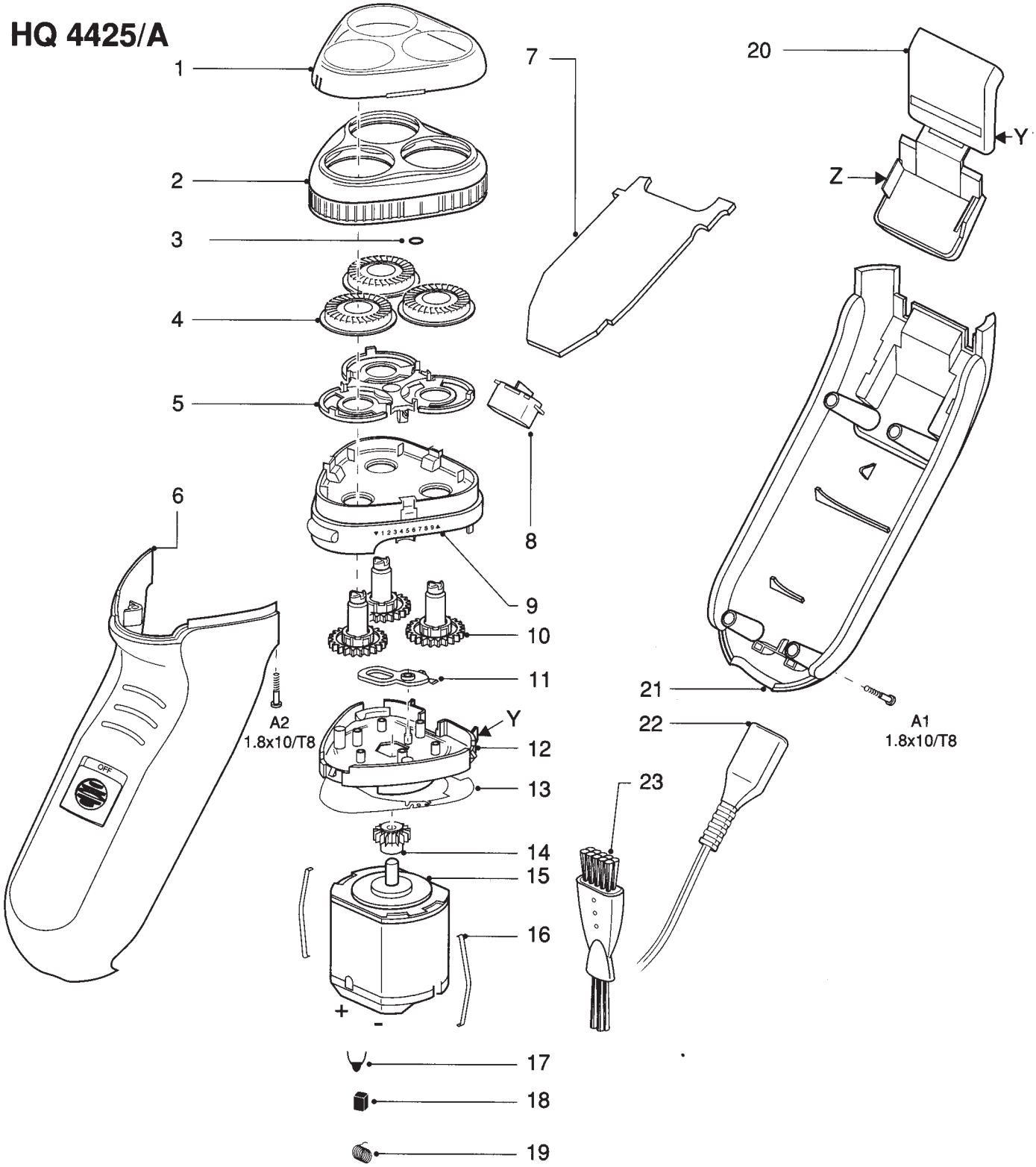
1	4822 441 11276	protecting cap
2	4822 441 11292	head housing
3		
4	4822 690 30471	HQ3 shaving head
5	4822 404 40657	head holder
6	4822 441 11927	housing
7	4822 214 12126	control module
8	4822 277 21689	on/off switch
9	4822 256 10349	holder
10	4822 267 31319	inlet
11	4822 442 00743	hairchamber
12	4822 522 32852	gearwheel
13	4822 404 40656	lever
14	4822 441 11275	frame
15		
16	4822 522 32851	pinion
17	4822 361 20936	motor
18	4822 492 63165	motor clamp
19	4822 690 10081	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12125	power module
24	4822 256 92094	holder
25	4822 138 10609	NiMH pack 4/5AA
26	4822 442 00823	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

HQ 4405/A



1	4822 441 11416	protecting cap
2	4822 256 10191	head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11949	housing PH
7	4822 214 70591	power module
8	4822 267 31319	inlet
9	4822 442 00252	hairchamber PH
10	4822 522 33372	gearwheel
11	4822 404 40656	lever
12	4822 441 11415	frame
13	4822 466 10932	sealing plate
14	4822 522 33371	pinion
15	4822 361 30455	motor
16	4822 492 71735	motor clamp
17	4822 122 31177	capacitor
18	4822 362 40181	carbon brush
19	4822 492 62703	contact spring
20	4822 441 11514	trimmer
21	4822 442 00862	cover
22	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
23	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

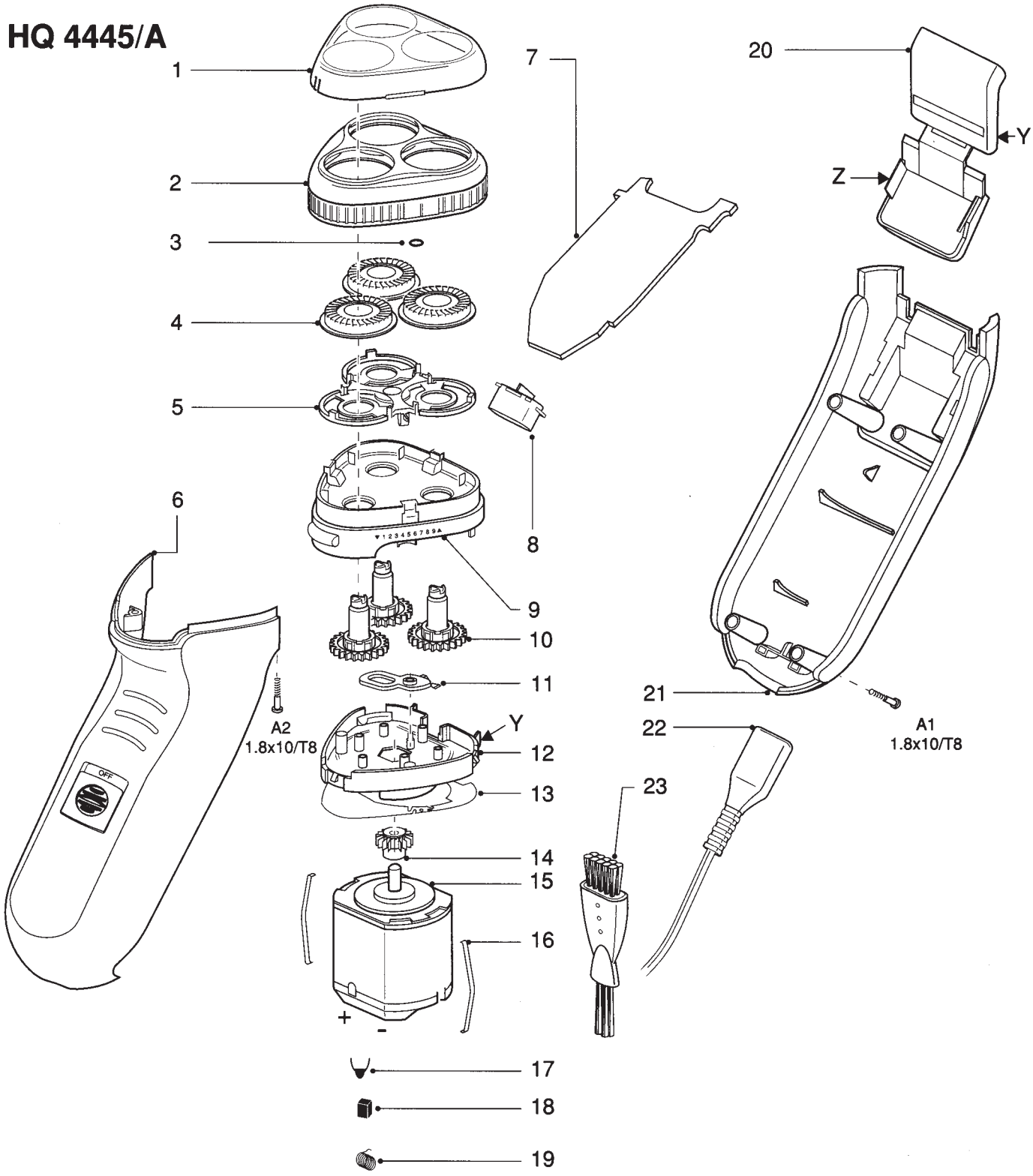
HQ 4425/A



1	4822 441 11416	protecting cap	16	4822 492 71735	motor clamp
2	4822 256 10191	head housing	17	4822 122 31177	capacitor
3	4822 466 62581	rubber ring	18	4822 362 40181	carbon brush
4	4822 690 30468	HQ4 shaving head	19	4822 492 62703	contact spring
5	4822 404 40728	retaining bracket	20	4822 441 11514	trimmer
6	4822 441 11951	housing PH	21	4822 442 00852	cover
7	4822 214 70591	power module	22	4822 321 10095	flex EU
8	4822 267 31319	inlet		4822 321 10096	flex GB
9	4822 442 00252	hairchamber PH		4822 321 10097	flex CDN
10	4822 522 33372	gearwheel		4822 321 10148	flex AUS/NZ
11	4822 404 40656	lever		4822 321 10344	flex USA
12	4822 441 11415	frame	23	4822 479 30183	cleaning brush
13	4822 466 10932	sealing plate	A	4822 502 30526	s.t.screw 1.8x10/T8
14	4822 522 33371	pinion			
15	4822 361 30455	motor			

PCS 88 394

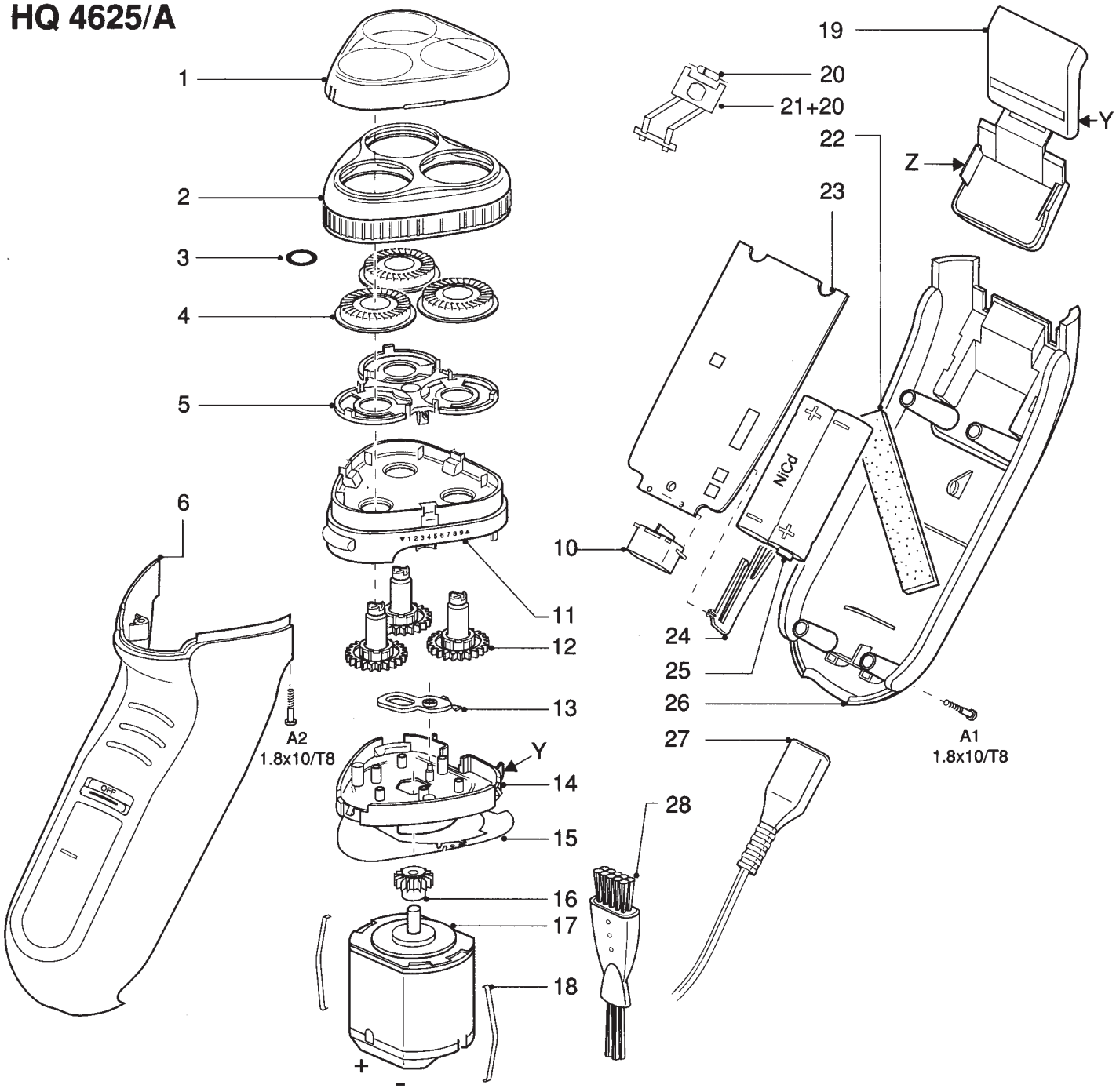
HQ 4445/A



1	4822 441 11416	protecting cap
2	4822 256 10191	head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11713	housing PH
7	4822 214 70591	power module
8	4822 267 31319	inlet
9	4822 442 00252	hairchamber PH
10	4822 522 33372	gearwheel
11	4822 404 40656	lever
12	4822 441 11415	frame
13	4822 466 10932	sealing plate
14	4822 522 33371	pinion
15	4822 361 30455	motor
16	4822 492 71735	motor clamp
17	4822 122 31177	capacitor
18	4822 362 40181	carbon brush
19	4822 492 62703	contact spring
20	4822 441 11514	trimmer
21	4822 442 00253	cover
22	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
23	4822 479 30077	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 86 860

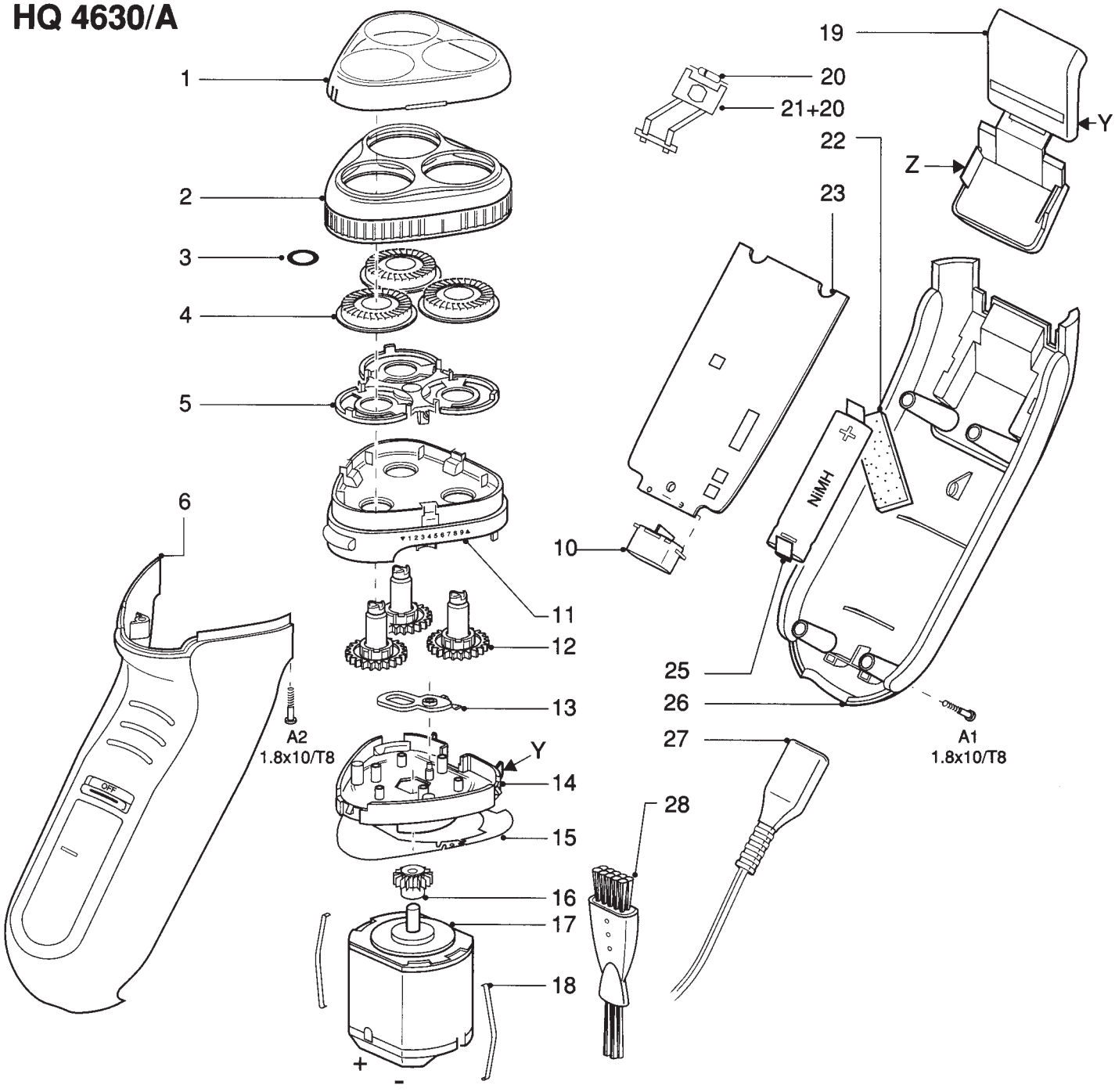
HQ 4625/A



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11934	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12165	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 442 00801	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

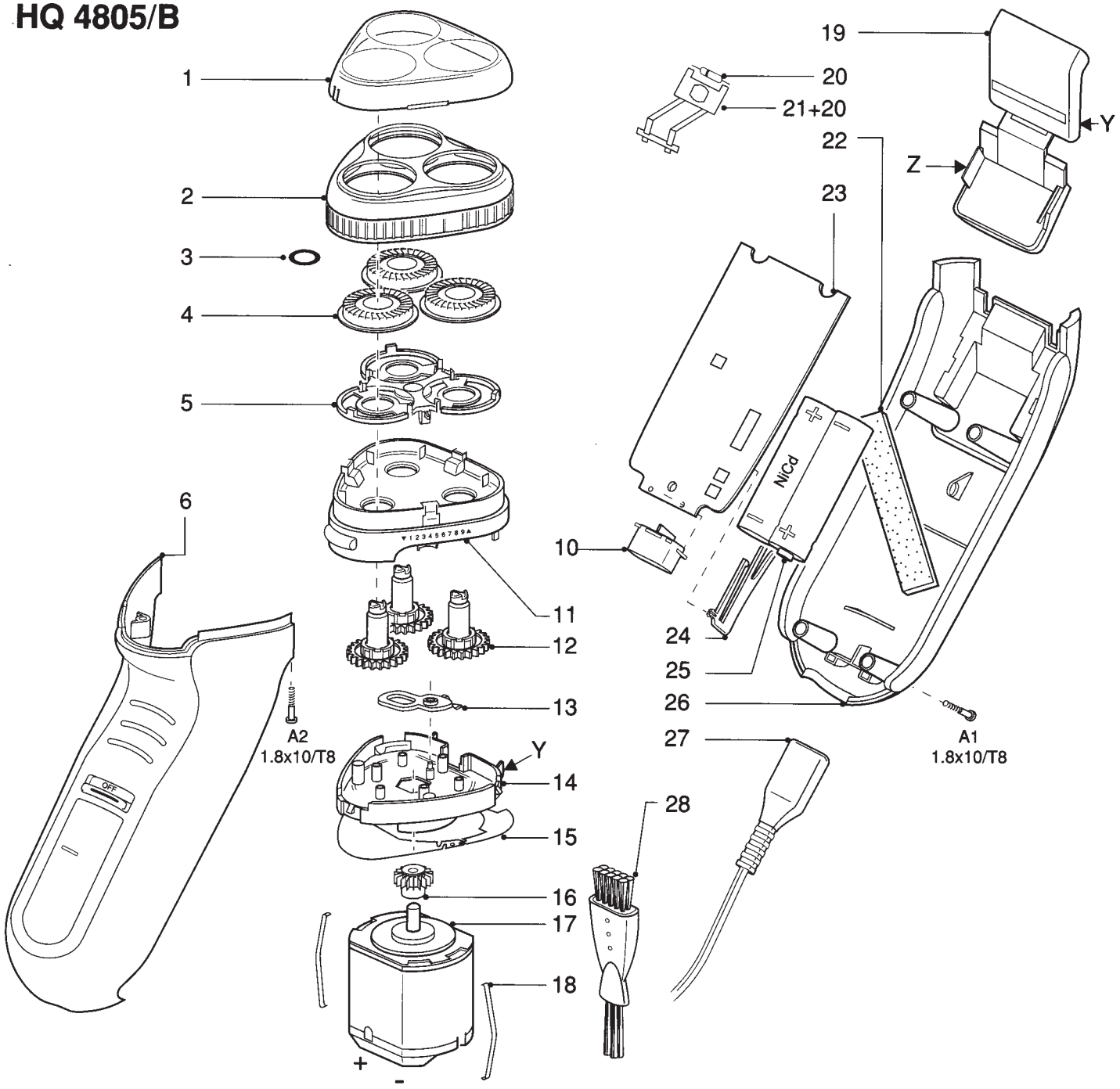
PCS 88 398

HQ 4630/A



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11933	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 10959	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12164	power module
24		
25	4822 138 10584	NiMH cell AA
26	4822 442 00801	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

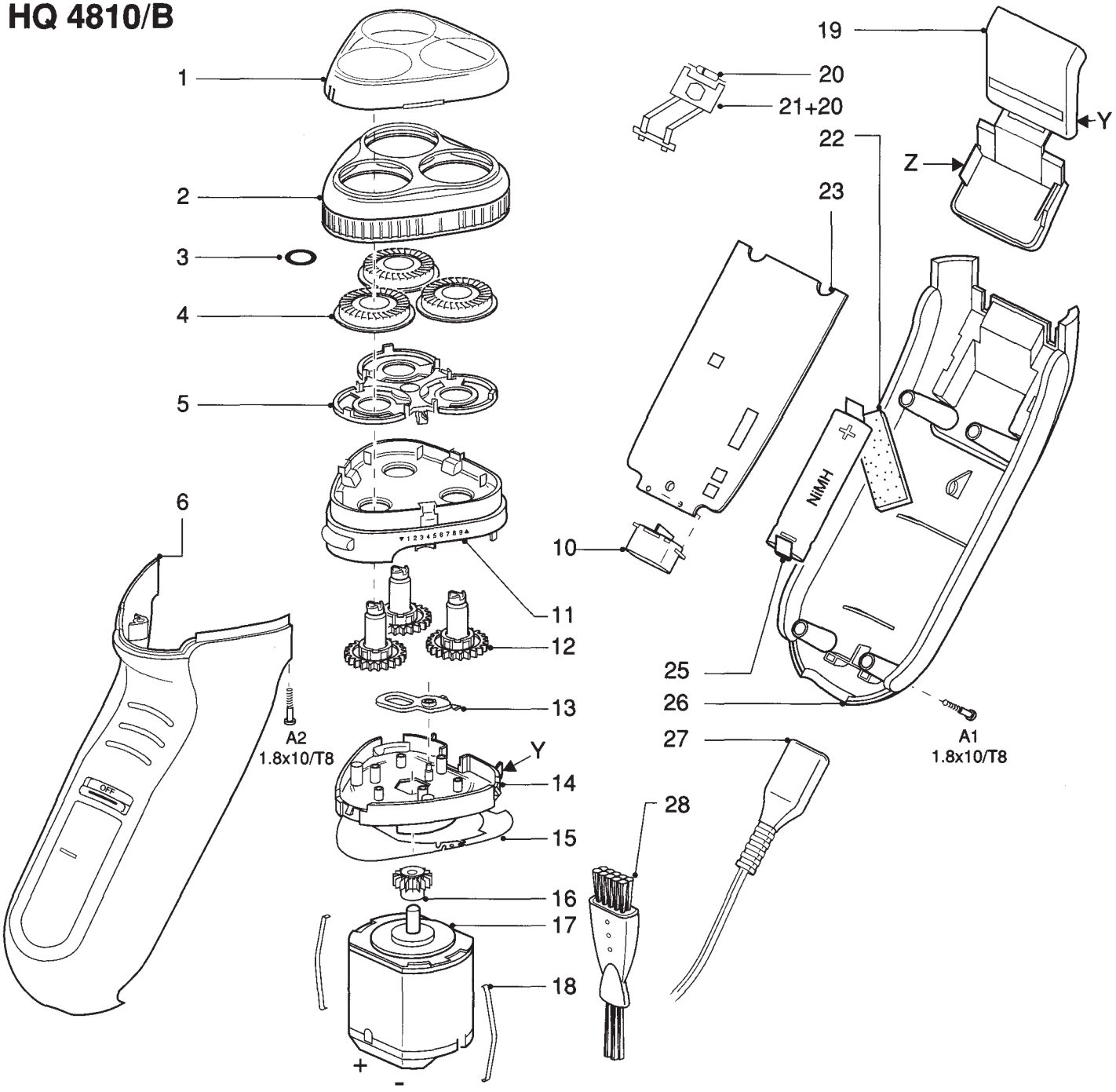
HQ 4805/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11952	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12204	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 442 00863	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

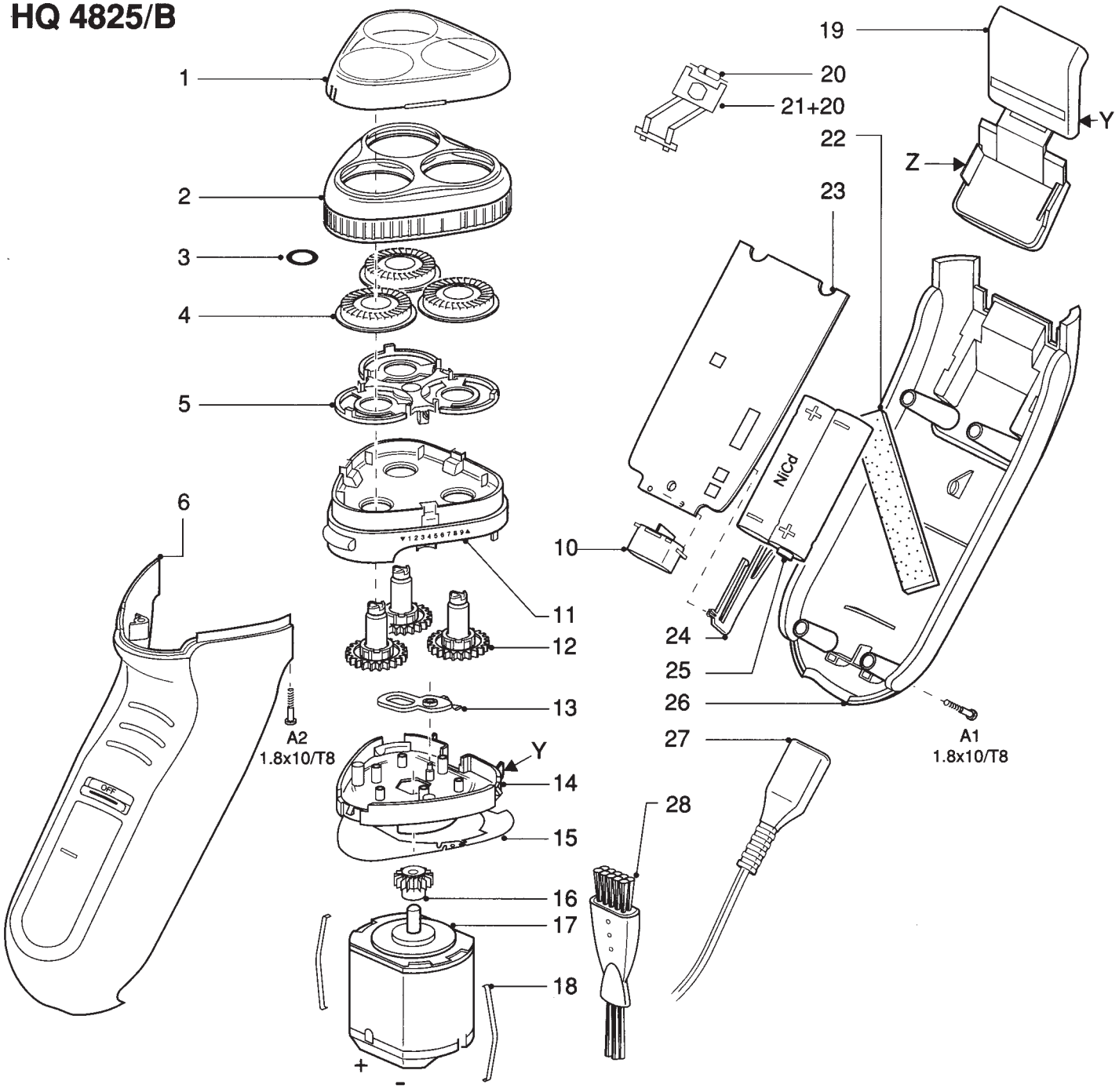
PCS 88 402

HQ 4810/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11954	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 10959	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12088	power module
24		
25	4822 138 10584	NiMH cell AA
26	4822 442 00863	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

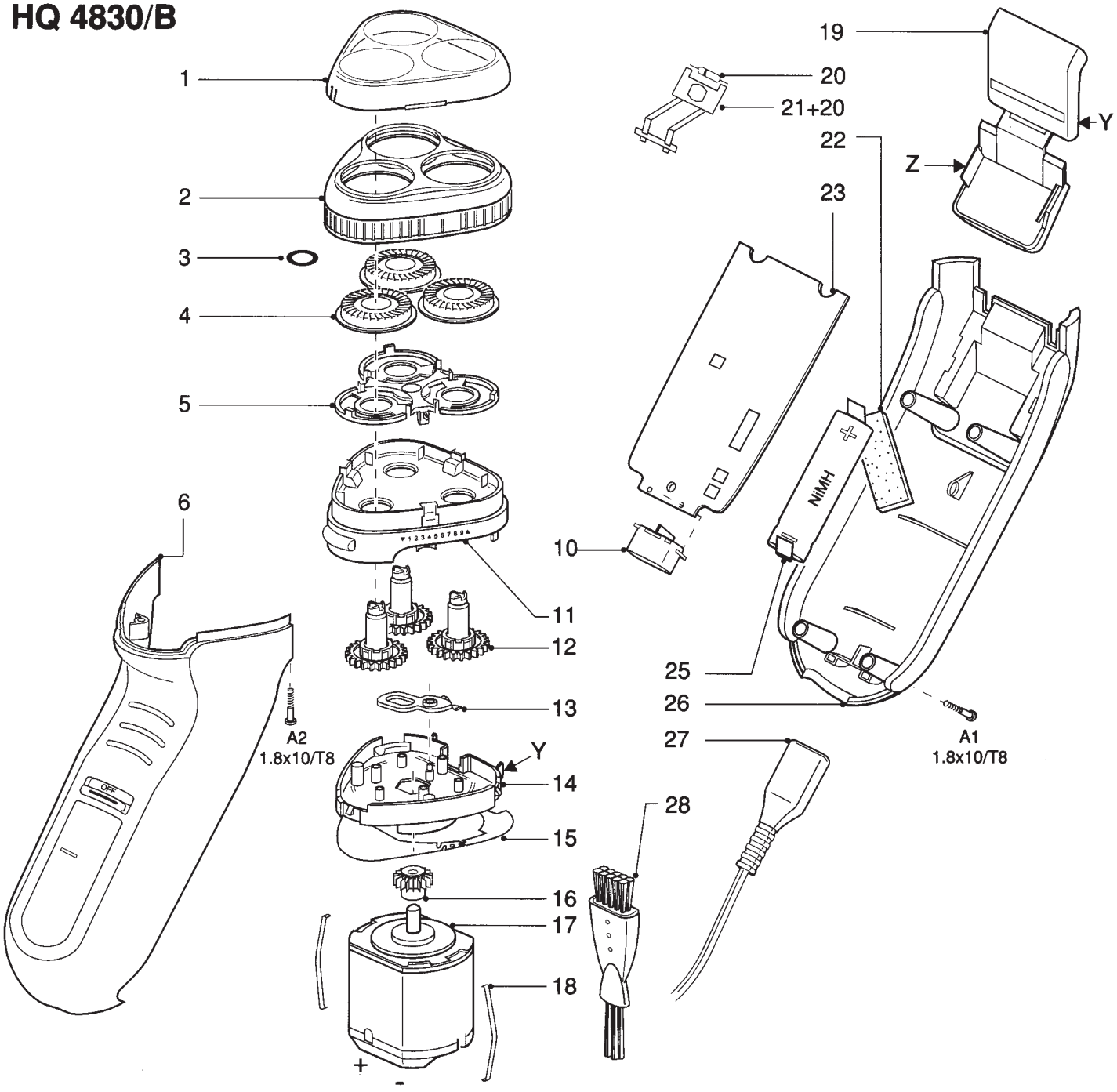
HQ 4825/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11932	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12132	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 442 00801	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 406

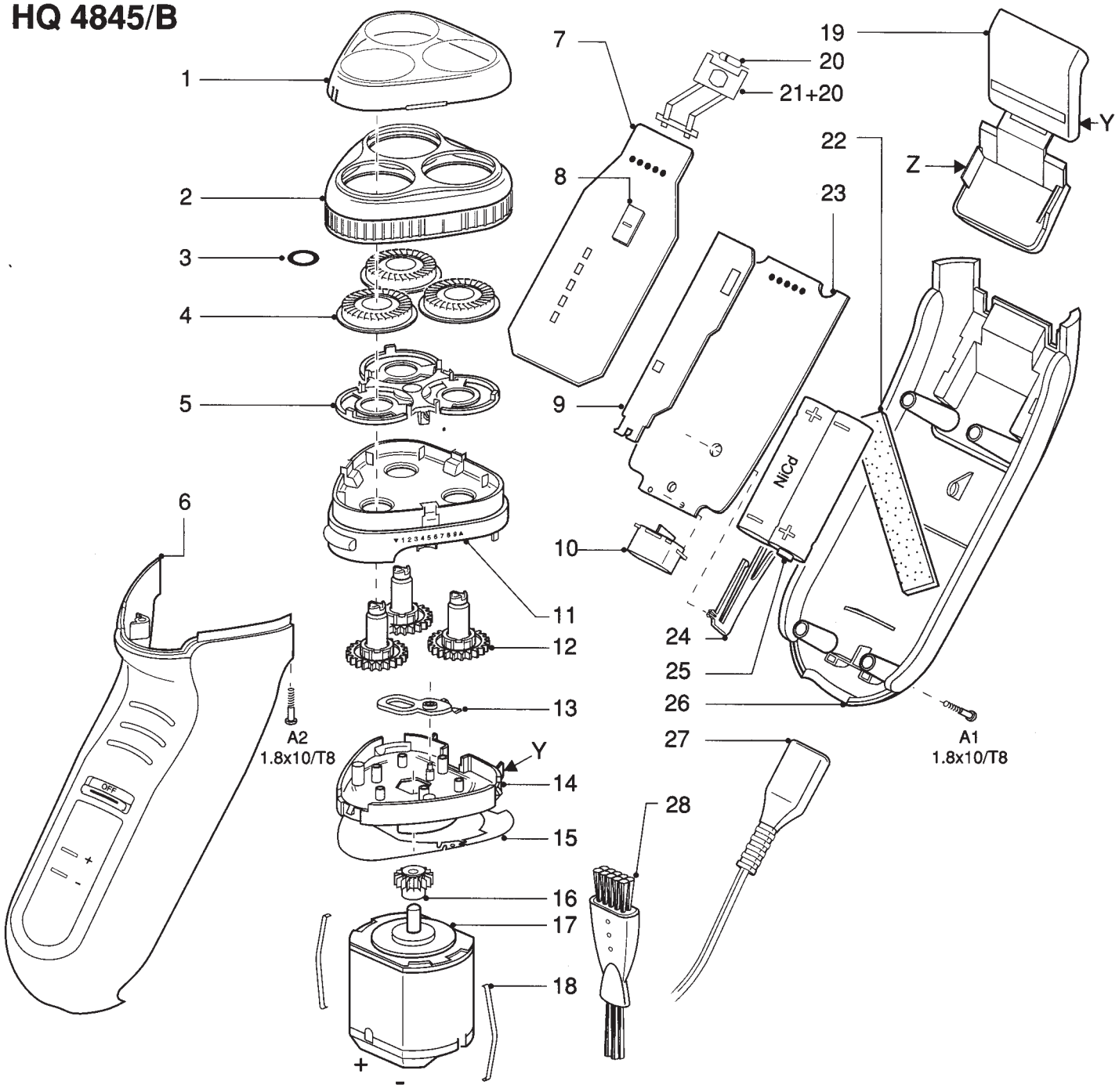
HQ 4830/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11916	housing
7		
8		
9		
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 10959	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10924	connector 39mm
22	4822 466 91312	foam plate
23	4822 214 12088	power module
24		
25	4822 138 10584	NiMH cell AA
26	4822 442 00801	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 408

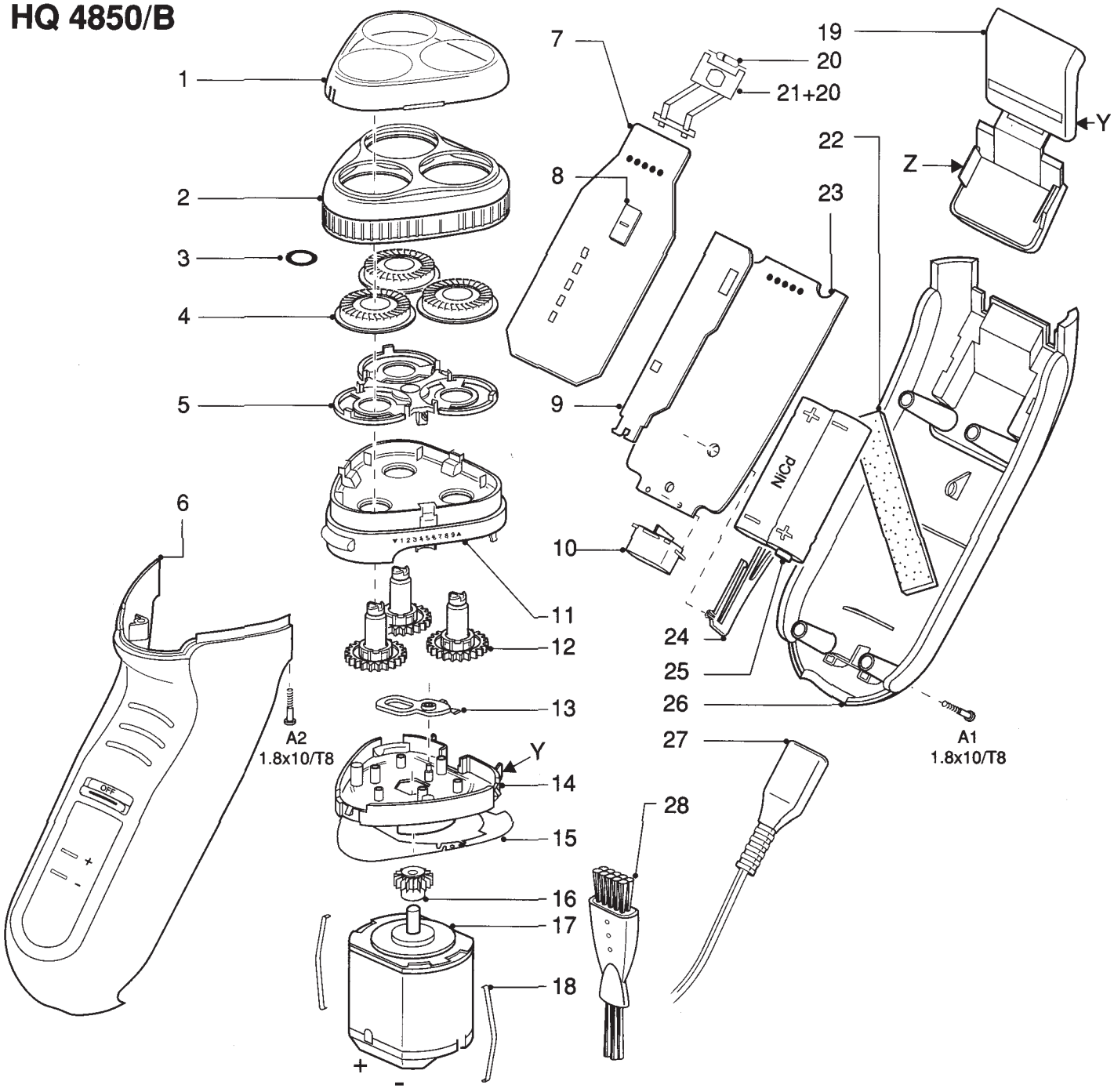
HQ 4845/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11728	housing
7	4822 214 12133	control module
8	4822 277 21689	on/off switch
9	4822 256 10349	holder
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12089	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 442 00829	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 410

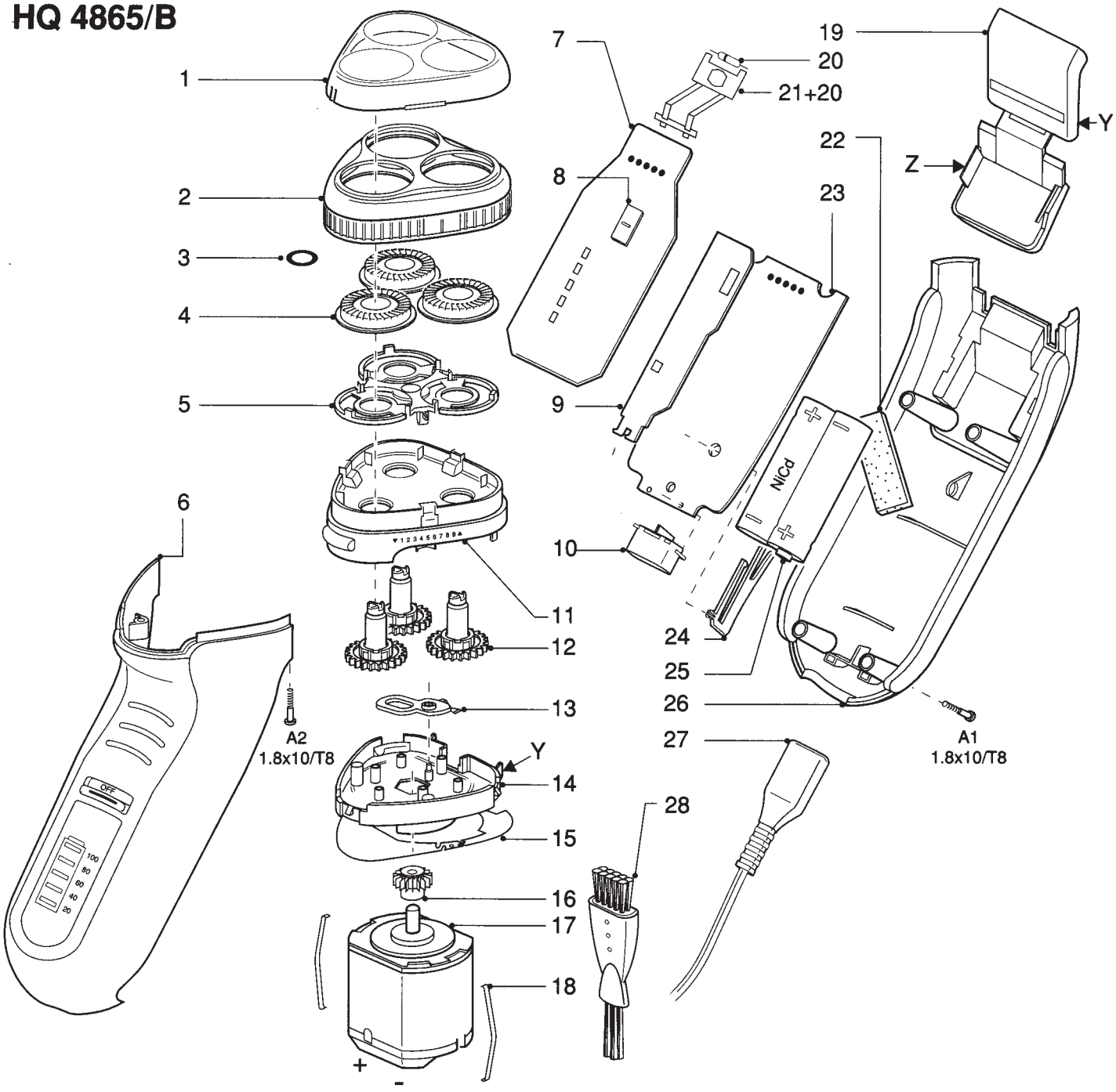
HQ 4850/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11718	housing
7	4822 214 12134	control module
8	4822 277 21689	on/off switch
9	4822 256 10349	holder
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12125	power module
24	4822 256 92094	holder
25	4822 138 10609	NiMH pack 4/5AA
26	4822 442 00831	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 412

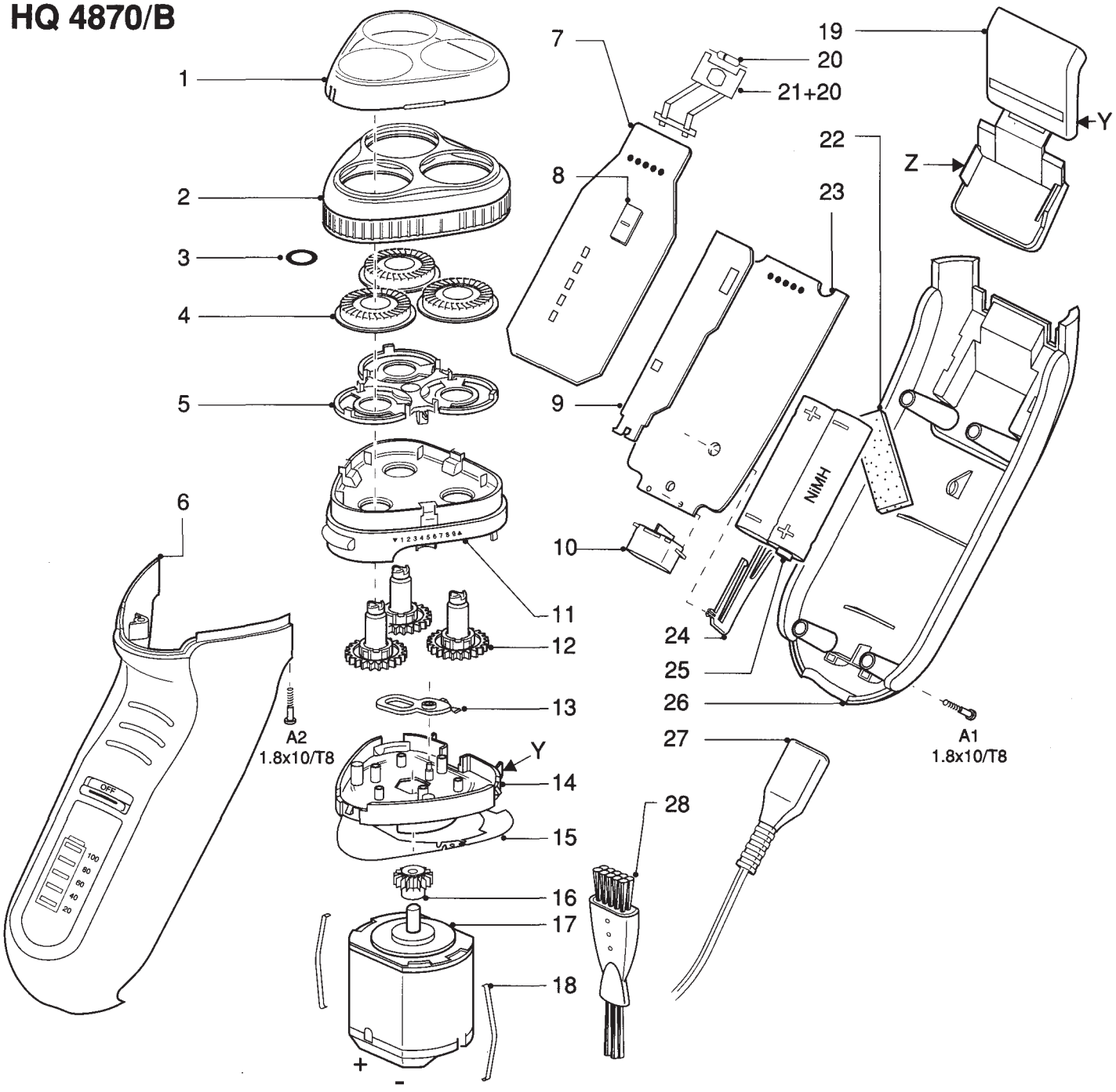
HQ 4865/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11731	housing
7	4822 214 12131	control module
8	4822 277 21689	on/off switch
9	4822 256 10349	holder
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12089	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 442 00826	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 414

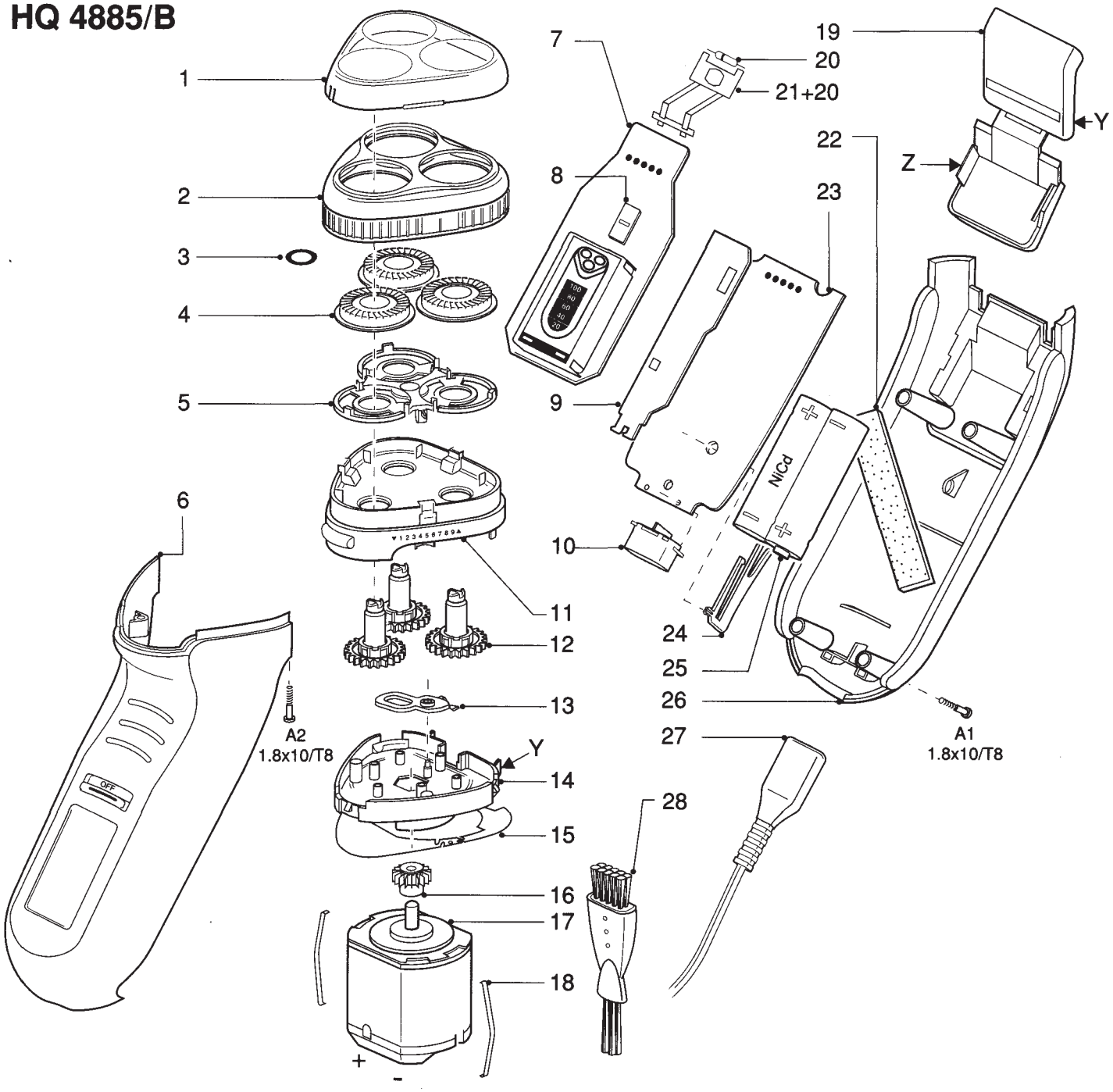
HQ 4870/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11733	housing
7	4822 214 12126	control module
8	4822 277 21689	on/off switch
9	4822 256 10349	holder
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12125	power module
24	4822 256 92094	holder
25	4822 138 10609	NiMH pack 4/5AA
26	4822 442 00824	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 416

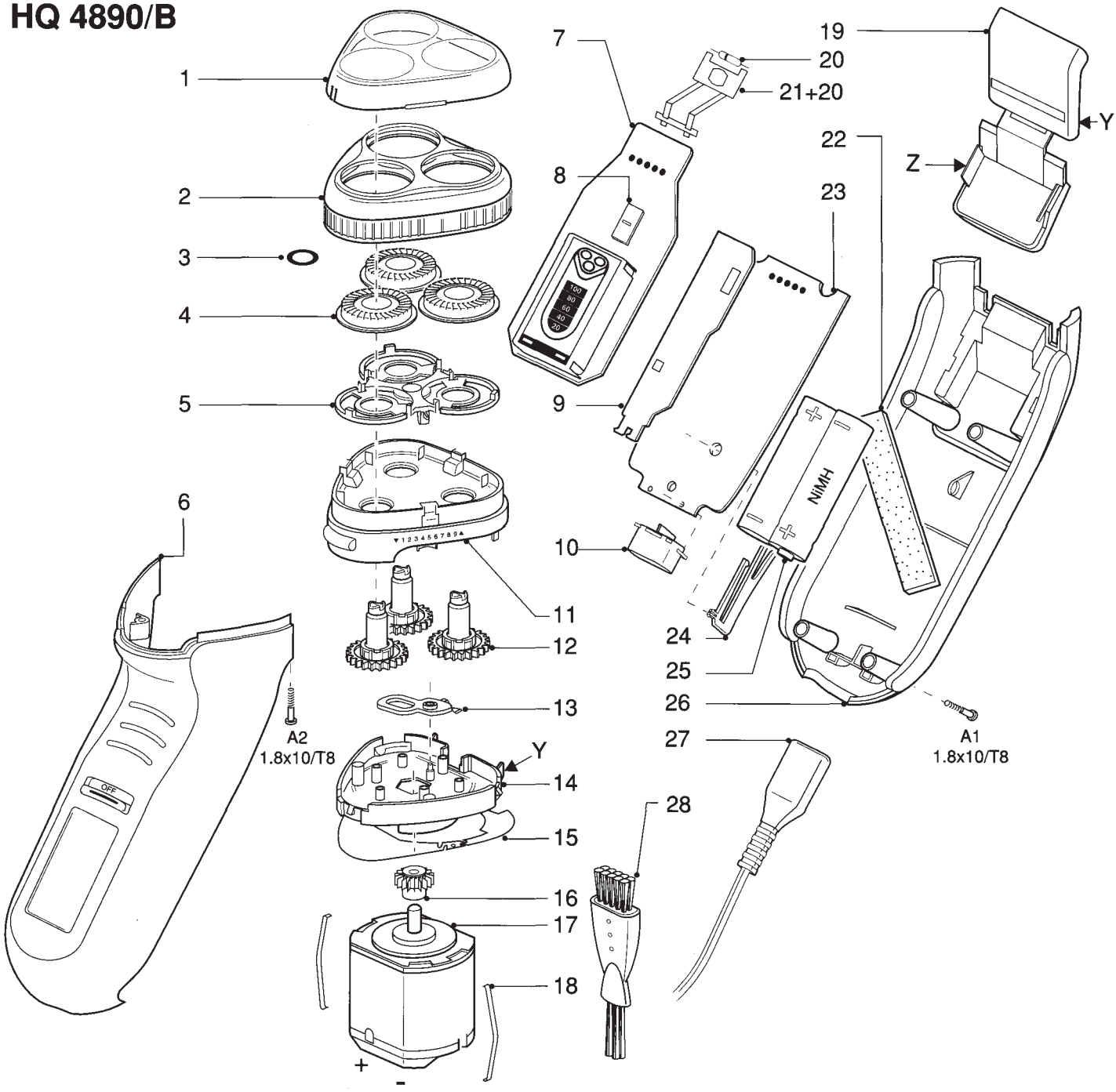
HQ 4885/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11734	housing
7	4822 214 12139	control module
8	4822 277 21689	on/off switch
9	4822 256 10349	holder
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12089	power module
24	4822 256 92094	holder
25	4822 138 10334	NiCd pack AA
26	4822 442 00833	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 418

HQ 4890/B



1	4822 441 11416	protecting cap
2	4822 256 10191	adj. head housing
3	4822 466 62581	rubber ring
4	4822 690 30468	HQ4 shaving head
5	4822 404 40728	retaining bracket
6	4822 441 11736	housing
7	4822 214 12138	control module
8	4822 277 21689	on/off switch
9	4822 256 10349	holder
10	4822 267 31319	inlet
11	4822 442 00252	hairchamber
12	4822 522 33372	gearwheel
13	4822 404 40656	lever
14	4822 441 11415	frame
15	4822 466 10932	sealing plate
16	4822 522 33371	pinion
17	4822 361 20657	motor
18	4822 492 71735	motor clamp
19	4822 441 11514	trimmer
20	4822 130 32173	OF217 diode
21	4822 265 10916	connector 21mm
22	4822 466 91312	foam plate
23	4822 214 12125	power module
24	4822 256 92094	holder
25	4822 138 10609	NiMH pack 4/5AA
26	4822 442 00832	cover
27	4822 321 10095	flex EU
	4822 321 10096	flex GB
	4822 321 10097	flex CDN
	4822 321 10148	flex AUS/NZ
	4822 321 10344	flex USA
28	4822 479 30183	cleaning brush
A	4822 502 30526	s.t.screw 1.8x10/T8

PCS 88 420

Service
Service
Service

HQ 3865/B
HQ 4845/B
HQ 4865/B
HQ 4885/B

Domestic Appliances and Personal Care

Circuit Description

INTRODUCTION

The Nudos shavers with NiCd cells can be recharged in 30 minutes by means of a Fly Back Self Oscillating Power Supply (SOPS).
This electronic circuit enables cells to be recharged at 100-240 V≃.
It is possible to shave directly from the mains, provided the voltage exceeds 100V≃.
The on/off slide has a locking device, which prevents the shaver from being switched on accidentally.
Leaving it connected to the mains after it is fully charged will not damage the shaver.
However, the life of the cells may be shortened if the shaver is kept permanently connected.
If the shaver is kept in the case when charging, make sure that the lid is open to prevent overheating.

HINTS FOR REPAIRS

a. Disassembly
- Remove the shaving unit, to prevent damages during repairs.
- Remove screws A1 (4X, of which 2 are under trimmer slide).
- Put the shaver on the table and remove the cover (item 26) from the shaver.
- The trimmer can be removed by pushing the hinge points (‘Y’ in exploded view, near item 11) slightly inwards.
- Detach the motor clamping springs (item 18) on the bearing block with a small screwdriver.
- The PC-boards with motor can now be removed from the housing.
- Remove screws A2 (2X).
- Unlock the snap connection (3X) between frame (item 14) and hair chamber (item 11).
- If the Power Module (item 23) and Time Control Module (item 7) have to be separated, read the instructions under IMPORTANT.

b. Assembly
- The assembly must be carried out in reverse order of what is described under a. Disassembly.
- The trimmer slide can be snapped into the cover last.

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97/04 - 99/01

PCS 99 106

PHILIPS

TECHNICAL DESCRIPTION

The electronics for the Nudos shavers with NiCd cells consist of 2 modules:
a Power Module (PM) and a Time Control Module (TCM), connected via a 5-pin connector.

POWER MODULE

The PM consists of a High Voltage Integrated Circuit (HVIC) and some external components, regulating the following functions:

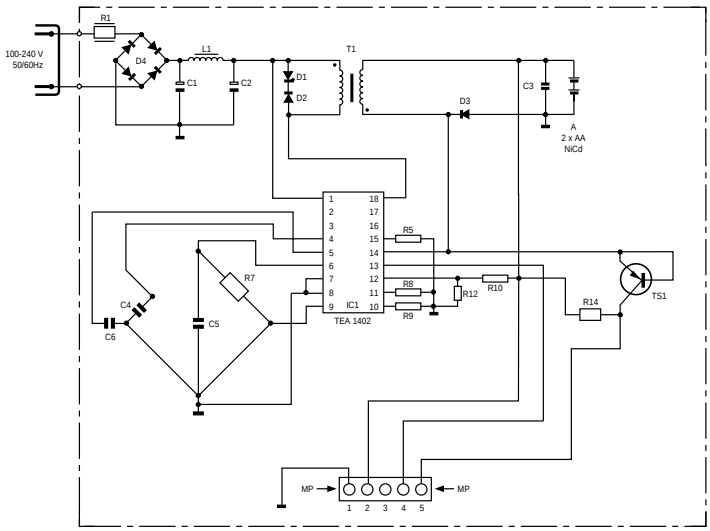
a. a current controller to adjust the charge current at 1200 mA or at 100 mA.
b. a 2.5 V⎓ dynamic supply controller for shaving from the mains.
c. a primary current limiter (max 400 mA) to protect the transformer from saturation.
d. a frequency limiter (max 60 kHz).
e. an open cell protection (Vbat>5V).
f. a temperature protection (Tchip>140˚C).

The mains voltage is full-wave rectified by D4 and smoothed by π-filter C1-L1-C2.
This filter also serves as a radio interference filter (RIF) for the SOPS and motor and as a suppressor of voltage transients from the mains.
Resistor R1, which functions as a fuse, limits the switch-on (inrush) current and the transient (surge) current.
The resistor interrupts in case of a too large mains current due to improper use or internal short circuit.
The primary-current circuit consists of the primary winding of T1 and the high-voltage switch inside the HVIC (IC1).
Snubber circuit D1-D2 limits the voltage across the primary winding during commutation.
During the flyback of the converter (when the switch is open) the secondary winding of T1 will deliver the primary energy across D3 and R2 to the cells or to the R26 sensed motor.

TIME CONTROL MODULE

The primary function of the TCM is:

Monitoring the capacity of the cells during charging and discharging.
- controlling the 3 charging modes:
  1. 1200 mA during max. 30 minutes.
  2. 100 mA if the voltage across the 2 cells exceeds 2.5.V and charging exceeds 30 minutes.
  3. 200-1800 mA at 2.5 V when the motor is switched on at the same time.



The TCM has 3 variants:

HQ3865 with 4 green LEDs and 1 red/green duoLED.
HQ4845 with 1 red LED and 1 green LED.
HQ4865 with 4 green LEDs and 1 red/green duoLED.
HQ4885 with LCD, 1 red LED and 1 green LED.

When the PM is connected to the mains, a signal will be generated by the SOPS, which is recognised by the TCM as 'mains on'.
Depending on the frequency of this signal, the TCM forces the PM into the quick charge mode as long as the capacity counter has not reached the 'full' state.
After max. 30 minutes the PM is set to the slow charge mode.
If during charging the shaver is switched on, the PM is set to the dynamic 2.5 V mode, in which the control switches from TCM to PM.
With empty cells this means that no charging takes place till the cells reach the 2.5 V⎓ level, consequently the capacity counter is not activated.
If the cell voltage is higher than 2.5 V, the motor current will come from the cells.
The capacity counter will now count down, as signalled via R26.
If the voltage drops below 2.5 V again, the PM takes over the supply of the motor current.

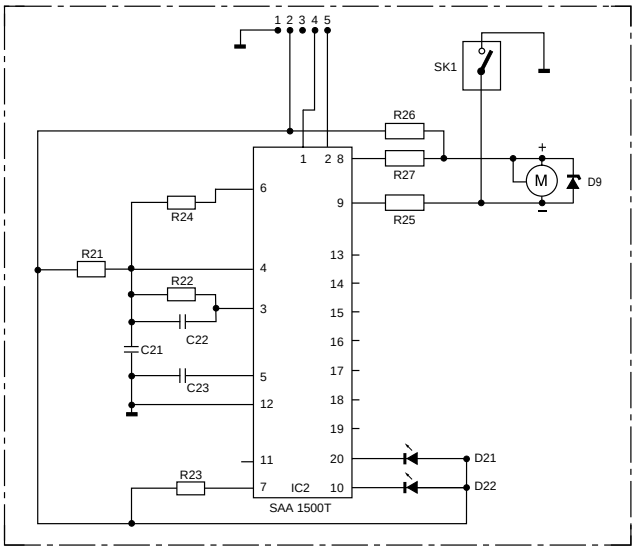
During charging and discharging the IC calculates the capacity available in the cells and subsequently generates signals to activate the LEDs and/or LCD, the sequence being:

HQ4845
The green LED '+' goes on.
If the cells are almost empty the red LED '-' will go on as well.
When the red LED goes out, there is enough capacity for one cordless shave of approx. 3 minutes.
After 30 minutes the green LED starts to blink, to indicate that the cells are full.
The signals during shaving are described under **'ALL'**.

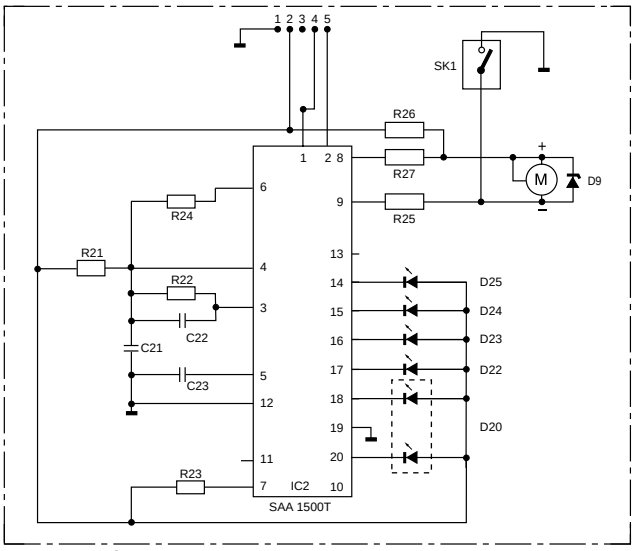
HQ3865 + HQ4865
One of the LEDs of the capacity indicator will start to blink.
If the cells are almost empty, the block '20' will be red.
When it turns green, there is enough capacity for one cordless shave.
Each time when another 20 % of the full charge has been reached, the next block of the indicator will start to blink.
After 30 minutes, the '100' block starts to blink.
This LED stops to blink as soon as shaver is fully charged.
If charging is continued (in the 100 mA mode now), the IC will force the PM to supply 1200 mA for half a sec. every 10 secs to compensate for the continuous burning of the LEDs.
When switching on and off, the actual capacity is shown for approx. 8 seconds.
After shaving cordless with a fully charged shaver for some time, the '100' LED will be no longer visible.
Then, the other blocks will gradually disappear one by one.
The next signal is described under **'ALL'**.

HQ4885
The green LED goes on and one segment of the LCD will start to blink.
If the cells are empty, this will be the '20' segment.
The red LED will remain on until there is enough capacity in the cells for one cordless shave of approx. 3 minutes.
Each time when another 20 % of the full charge has been reached the next segment will start to blink.
After 30 minutes the word 'FULL' and the green LED start to blink.
When shaving cordless with a fully charged shaver, first 'FULL' will disappear.
After some time the '100' segment will disappear, etc.
Finally, a blinking '20' segment will show together with the red LED, as described below.

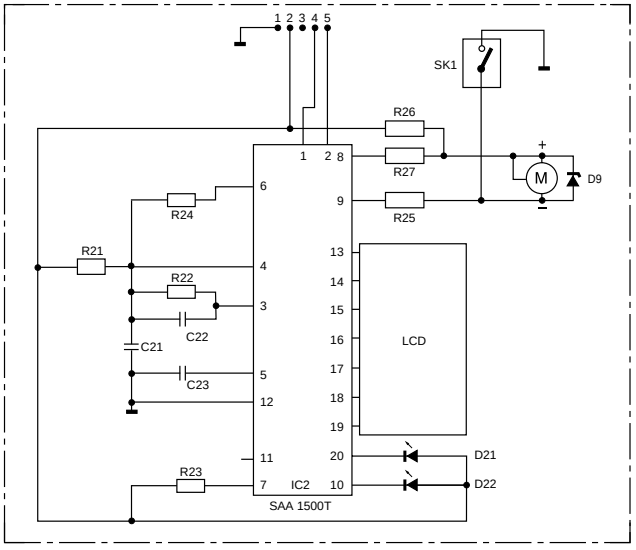
ALL
During discharging the capacity counter counts down proportional to the motor current.
When the counter reaches the 'zero' state, a Nearly Empty Indication (NEI) is given by the red LED.
After the shaver has been switched off the red LED will blink for 4 seconds.
If the shaver is not in use, the counter will count down at a slow rate during approx. 200 days, to compensate for the self-discharge of the cells and the power consumption of the ICs.



HQ 4845



HQ 3865/HQ 4865



HQ 4885

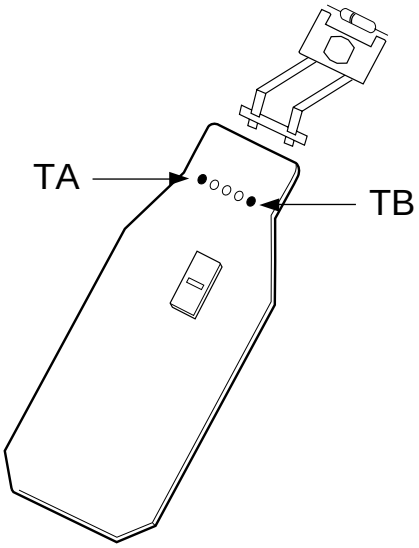
SELF TEST FUNCTION

The TCM has a test mode, which can only be used to test the TCM.
A precondition is that the appliance is not connected to the mains and that the cells are in a good condition.

Take the PCB-unit with motor out of the appliance and put it on the table upside down.
Disconnect the PCBs for a short moment to reset the TCM.
Connect points ‘TA’ and ‘TB’ (the outer contacts of the connector) with a test cord.

Be careful, don’t cause a short circuit!

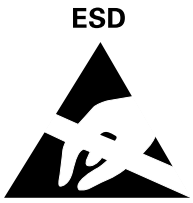
The LEDs/LCD will now indicate the charging cycle in an accelerated way.
Disconnect ‘TA’ and ‘TB’.
The discharge cycle is simulated by operating the on/off switch and by connecting ‘TA’ and ‘TB’ again.
After approx. 1 sec. the Nearly Empty Indication is given by the red LED.
Disconnect ‘TA’ and ‘TB’.
After the motor has been switched off, the red LED will blink for 4 secs.



IMPORTANT

If the 2 modules have to be separated during a repair, the TCM will lose all data on charging status.
When reconnected, the TCM will indicate the ‘Recharge’ status.
If the shaver is now connected to the mains, the charging current will be 1200 mA during 30 mins.
Depending on the capacity left in the cells, this high current may overheat the cells (but will not harm the cells), resulting in a higher temperature of the rear cover.
To prevent this, always let the shaver run till the motor stops and then recharge again.

As peak voltages may destroy electronic components on the TCM, a good working Zener diode (D9, item 20) is essential.
Therefore a new Zener must be fitted after replacement of a PM or TCM.
Never let the motor run without Zener diode!



ICs and other components are susceptible to electrostatic discharges (ESD).
Careless handling during repair can result in a drastic reduction of their lifetime.
When making repairs, make sure that you are connected to the same potential as the mass of the PC-boards via a wrist wrap with resistance.
Keep components and tools also at this potential.

NiCd cells contain substances which may pollute the environment.
Dispose of old cells at especially assigned places.

For a good performance of NiCd cells the shaver is to be recharged at least twice a year for 8 hours or longer.
This also applies to discharging:
run the shaver until the motor stops at least twice a year.

The production code can be found in the hairchamber (item 11) as YYWW.
The batchnumber is indicated by the next digits and is for factory use only.

NOTES:

Service
Service
Service

HQ 3870/B
HQ 4850/B
HQ 4870/B
HQ 4890/B

Domestic Appliances and Personal Care

Circuit Description

INTRODUCTION

The Nudos shavers with NiMH cells can be recharged in 60 minutes by means of a Fly Back Self Oscillating Power Supply (SOPS).
This electronic circuit enables cells to be recharged at 100-240 V≃.
It is possible to shave directly from the mains, provided the voltage exceeds 100V≃.
The on/off slide has a locking device, which prevents the shaver from being switched on accidentally.
Leaving it connected to the mains after it is fully charged will not damage the shaver.
However, the life of the cells may be shortened if the shaver is kept permanently connected.
If the shaver is kept in the case when charging, make sure that the lid is open to prevent overheating.

HINTS FOR REPAIRS

a. Disassembly

- Remove the shaving unit, to prevent damages during repairs.
- Remove screws A1 (4X, of which 2 are under trimmer slide).
- Put the shaver on the table and remove the cover (item 26) from the shaver.
- The trimmer can be removed by pushing the hinge points ('Y' in exploded view, near item 11) slightly inwards.
- Detach the motor clamping springs (item 18) on the bearing block with a small screwdriver.
- The PC-boards with motor can now be removed from the housing.
- Remove screws A2 (2X).
- Unlock the snap connection (3X) between frame (item 14) and hair chamber (item 11).
- If the Power Module (item 23) and Time Control Module (item 7) have to be separated, read the instructions under IMPORTANT.

b. Assembly

- The assembly must be carried out in reverse order of what is described under a. Disassembly.
- The trimmer slide can be snapped into the cover last.

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PHILIPS

TECHNICAL DESCRIPTION

The electronics for the Nudos shavers with NiMH cells consist of 2 modules:
a Power Module (PM) and a Time Control Module (TCM), connected via a 5-pin connector.

POWER MODULE

The PM consists of a High Voltage Integrated Circuit (HVIC) and some external components, regulating the following functions:

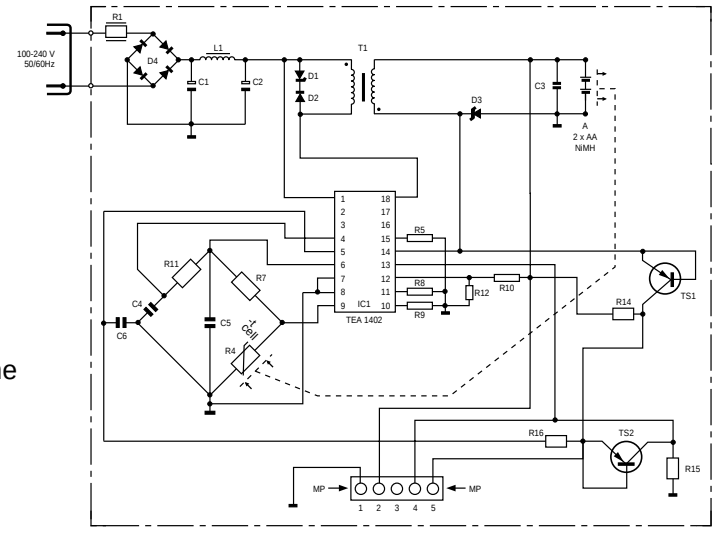
a. a 2.5 V⎓ dynamic supply controller for shaving from the mains.
c. a primary current limiter (max 400 mA) to protect the transformer from saturation.
d. a frequency limiter (max 60 kHz).
e. an open cell protection (Vbat>5V).
f. a temperature protection (Tchip>140˚C).
g. a cell temperature protection (Tbat>60˚C).

The mains voltage is full-wave rectified by D4 and smoothed by π-filter C1-L1-C2.
This filter also serves as a radio interference filter (RIF) for the SOPS and motor and as a suppressor of voltage transients from the mains.
Resistor R1, which functions as a fuse, limits the switch-on (inrush) current and the transient (surge) current.
The resistor interrupts in case of a too large mains current due to improper use or internal short circuit.
The primary-current circuit consists of the primary winding of T1 and the high-voltage switch inside the HVIC (IC1).
Snubber circuit D1-D2 limits the voltage across the primary winding during commutation.
During the flyback of the converter (when the switch is open) the secondary winding of T1 will deliver the primary energy across D3 and R2 to the cells or to the R26 sensed motor.
As the life of NiMH cells decreases when the operating temperature is too high, a temperature protection has been provided by means of IC1 and NTC resistor R4 (when it is switched on the charging current is reduced from 1000 to 25 mA).
The life of NiMH cells may also be reduced by too high charging currents.
Compared to the NUDOS NiCd shavers this has led to a reduction of the charging currents and a consequent lengthening of the charging time.

TIME CONTROL MODULE

The primary function of the TCM is:

- monitoring the capacity of the cells during charging and discharging.



- controlling the 3 charging modes:
  1. 1000 mA during 1 hour.
  2. 25 mA if charging exceeds 1 hour.
  3. 200-1800 mA at 2.5 V when the motor is switched on at the same time.

The TCM has 3 variants:

HQ3870 with 4 green LEDs and 1 red/green duoLED.
HQ4850 with 1 red LED and 1 green LED.
HQ4870 with 4 green LEDs and 1 red/green duoLED.
HQ4890 with LCD, 1 red LED and 1 green LED.

When the PM is connected to the mains, a signal will be generated by the SOPS, which is recognised by the TCM as 'mains on'.
Depending on the frequency of this signal, the TCM forces the PM into the quick charge mode as long as the capacity counter has not reached the 'full' state.
In quick charge mode the temperature is monitored via NTC resistor R4.
If Tbat>60˚C, the PM is set to the slow charge mode.
After max. 1 hour the PM is set to the slow charge mode.
If during charging the shaver is switched on, the PM is set to the dynamic 2.5 V mode, in which the control switches from TCM to PM.
With empty cells this means that no charging takes place till the cells reach the 2.5 V⎓ level, consequently the capacity counter is not activated.
If the cell voltage is higher than 2.5 V, the motor current will come from the cells.
The capacity counter will now count down, as signalled via R26.
If the voltage drops below 2.5 V again, the PM takes over the supply of the motor current.

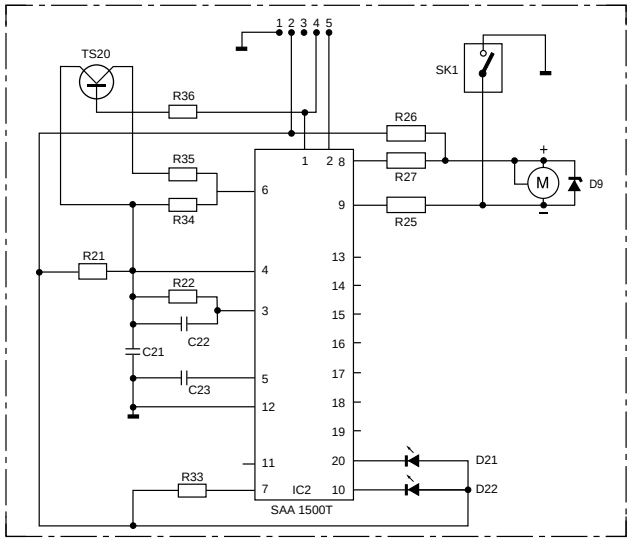
During charging and discharging the IC calculates the capacity available in the cells and subsequently generates signals to activate the LEDs and/or LCD, the sequence being:

HQ4850
The green LED '+' goes on.
If the cells are almost empty the red LED '-' will go on as well.
When the red LED goes out, there is enough capacity for one cordless shave of approx. 3 minutes.
After 60 minutes the green LED starts to blink, to indicate that the cells are full.
The signals during shaving are described under **'ALL'**.

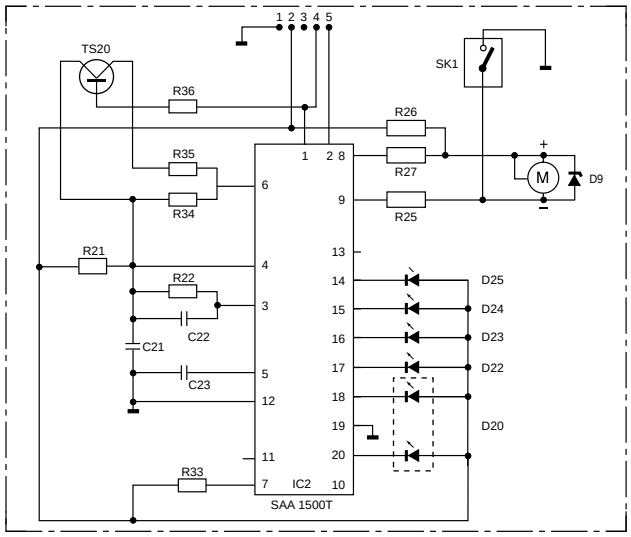
HQ3870 + HQ4870
One of the LEDs of the capacity indicator will start to blink.
If the cells are almost empty, the block '20' will be red.
When it turns green, there is enough capacity for one cordless shave.
Each time when another 20 % of the full charge has been reached, the next block of the indicator will start to blink.
After 60 minutes, the '100' block starts to blink.
This LED stops to blink as soon as shaver is fully charged.
If charging is continued (in the 25 mA mode now), the IC will force the PM to supply 1000 mA for half a sec. every 10 secs to compensate for the continuous burning of the LEDs.
When switching on and off, the actual capacity is shown for approx. 8 seconds.
After shaving cordless with a fully charged shaver for some time, the '100' LED will be no longer visible.
Then, the other blocks will gradually disappear one by one. The next signal is described under **'ALL'**.

HQ4890
The green LED goes on and one segment of the LCD will start to blink.
If the cells are empty, this will be the '20' segment.
The red LED will remain on until there is enough capacity in the cells for one cordless shave of approx. 3 minutes.
Each time when another 20 % of the full charge has been reached the next segment will start to blink.
After 60 minutes the word 'FULL' and the green LED start to blink.
When shaving cordless with a fully charged shaver, first 'FULL' will disappear.
After some time the '100' segment will disappear, etc.
Finally, a blinking '20' segment will show together with the red LED, as described below.

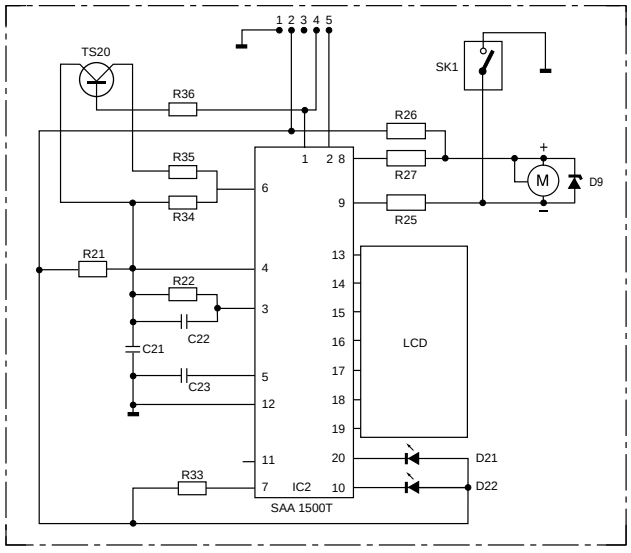
ALL
During discharging the capacity counter counts down proportional to the motor current.
When the counter reaches the 'zero' state, a Nearly Empty Indication (NEI) is given by the red LED.
After the shaver has been switched off the red LED will blink for 4 seconds.
If the shaver is not in use, the counter will count down at a slow rate during approx. 100 or 200 days, to compensate for the self-discharge of the cells and the power consumption of the ICs (100 days at Tamb>35˚C, 200 days at Tamb<35˚C).



HQ 4850



HQ 3870/HQ 4870



HQ 4890

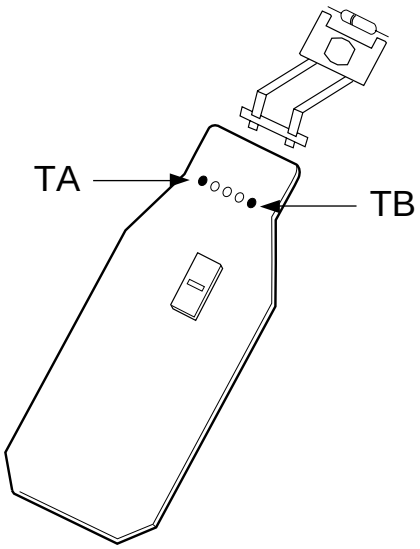
SELF TEST FUNCTION

The TCM has a test mode, which can only be used to test the TCM.
A precondition is that the appliance is not connected to the mains and that the cells are in a good condition.

Take the PCB-unit with motor out of the appliance and put it on the table upside down.
Disconnect the PCBs for a short moment to reset the TCM.
Connect points ‘TA’ and ‘TB’ (the outer contacts of the connector) with a test cord.

Be careful, don’t cause a short circuit!

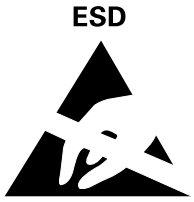
The LEDs/LCD will now indicate the charging cycle in an accelerated way.
Disconnect ‘TA’ and ‘TB’.
The discharge cycle is simulated by operating the on/off switch and by connecting ‘TA’ and ‘TB’ again.
After approx. 1 sec. the Nearly Empty Indication is given by the red LED.
Disconnect ‘TA’ and ‘TB’.
After the motor has been switched off, the red LED will blink for 4 secs.



IMPORTANT

If the 2 modules have to be separated during a repair, the TCM will lose all data on charging status.
When reconnected, the TCM will indicate the ‘Recharge’ status.
If the shaver is now connected to the mains, the charging current will be 1000 mA during 60 mins.
Depending on the capacity left in the cells, this high current may heat the cells and may cause the cell overheat protection to come into operation, resulting in a difference between cell capacity and TCM indication.
To prevent this, always let the shaver run till the motor stops and then recharge again.

As peak voltages may destroy electronic components on the TCM, a good working Zener diode (D9, item 20) is essential.
Therefore a new Zener must be fitted after replacement of a PM or TCM.
Never let the motor run without Zener diode!



ICs and some other components are susceptible to electrostatic discharges (ESD).
Careless handling during repair can result in a drastic reduction of their lifetime.
When making repairs, make sure that you are connected to the same potential as the mass of the PC-boards via a wrist wrap with resistance.
Keep components and tools also at this potential.

NiMH cells contain less then 0.01 % cadmium.
Yet it is advised to ensure that the cells are separated from the normal household refuse and that they are disposed of at an officially assigned place.

The production code can be found in the hairchamber (item 11) as YYWW.
The batchnumber is indicated by the next digits and is for factory use only.

NOTES: